Review of the 1983-84 British Columbia Herring Fishery and Spawn Abundance

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September, 1985

Canadian Industry Report of
Fisheries and Aquatic Sciences
No. 163

86-0058/

Canadian Industry Report of Fisheries and Aquatic Sciences

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Cat. No. Fs 97/14/163 ISSN 0704-3694

Correct citation for this publication:
Chalmers, D.D. and D. Haase. 1985. Review of the 1983-84 British Columbia herring fishery and spawn abundance. Can. Ind. Rep. Fish. Aquat. Sci. 163: 68 p.

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ABSTRACT

Chalmers, D.D. and D. Haase. 1985. Review of the 1983-84 British Columbia herring fishery and spawn abundance. Can. Ind. Rep. Fish. Aquat. Sci. 163: 68 p.

During the 1983-84 fishing season in British Columbia, herring were fished for food and bait from November 21 to December 9, 1983 and for roe from March 2 to 30, 1984. The total food and bait catch was 857 tons (777 mt). The total roe herring catch was 34,315 tons (31,130 mt) with a landed value of $34.3 million. There were 28 spawn-on-kelp licences issued for a total production of 188 tons (170 mt). The 9.5 million standard square meters of spawn recorded coastwide represented a 39% decrease from the 1981-83 average of 15.6 million.

Key words: Pacific herring, roe fishery, spawn-on-kelp, catch, spawn.

RÉSUMÉ

Chalmers, D.D. and D. Haase. 1985. Review of the 1983-84 British Columbia herring fishery and spawn abundance. Can. Ind. Rep. Fish. Aquat. Sci. 163: 68 p.

Au cours de la saison de pêche 1983-1984 en Colombie-Britannique, le hareng a été pêché comme nourriture et appât du 21 novembre au 9 décembre 1983 et pour la rogue du 2 au 30 mars 1984. Les prises de hareng de consommation et d'appât totalisaient 857 t (777 tm) tandis que les captures totales de hareng rogué s'élevaient à 34 315 t (31 130 tm), dont la valeur au débarquement se chiffrait à $34.3 millions. La production totale, tirée de 28 permis d'exploitation des oeufs sur varech, s'élevait à 188 t (170 tm). Sur tout le littoral, la rogue couvrait 9,5 millions de mètres carrés, soit une baisse de 39% par rapport à la moyenne de 15,6 millions observée en 1981-1983.

Mots-clés: hareng du Pacifique, pêche de la rogue, oeufs sur varech, prises, oeufs.

INTRODUCTION

Each year after the Pacific herring (Clupea harengus pallasi) have returned to inshore waters in preparation for spring spawning, they are subjected to two major commercial fisheries in the coastal waters of British Columbia. The first is a food and bait fishery which takes place in November and December when the fat content is high and the fish are easily accessible in the inlets and bays. The second is a roe fishery which occurs in March, just prior to spawning when gonad development is at a maximum. Both these fisheries are summarized in the following pages.

Once the herring have deposited their eggs, measurements of individual spawnings are made by fisheries staff. Since the amount of spawn deposited is directly related to the number of spawners, this information, coupled with catch and age composition data, allows the estimation of the total number of fish present at the beginning of the season, the proportion taken by the fishery, and the strengths of the various year classes. These data are also used to forecast the amount of herring that will return to spawn in the coming year (Haist and Stocker 1984). These forecasts, along with social, economic and management considerations, are used to establish fishing quotas for each of the three licence areas.

The present report is one of a series of publications by the Department of Fisheries and Oceans (DFO) aimed at providing the annual summary of British Columbia herring fishery and spawn abundance. In order to simplify data tabulation, interpretation and comparison with previous years, all tonnage is given in short tons (907.18 kg).

METHODS

The information for the fishery portion of this report was obtained from fishery officers' daily radio telephone reports to Field Operations Headquarters in Vancouver. These reports contain pre-fishery test data (tonnage, fish length and roe maturity), gear counts, opening and closure times, hailed catches and weather conditions. Tonnage estimates of herring stocks are determined acoustically using echo sounding and are subjective interpretations based on past experience of the vessel masters.

Spawn data were obtained from annual spawn reports compiled by DFO field staff. These reports document timing and location of individual spawnings as well as length and width of spawn depositions, average layers of eggs on each type of substrate utilized and percentage of vegetation cover.

Field staff measure spawn patches at low tide by pacing them out and plotting them on large scale charts or shoreline vegetation maps made from aerial photographs (e.g. Haegele and Hamey 1979). In order to determine the extent of sub-tidal depositions, a raking apparatus is dragged along the sea bottom to catch pieces of vegetation along with whatever eggs may be attached. This method has been unreliable in areas where the vegetation is sparse or spotty; therefore, whenever possible, spawns are surveyed by divers using snorkles or S.C.U.B.A. gear.

For this report, spawn data were converted to a standard measurement (standard square meters at medium intensity - SSM) so that spawnings can be compared from area to area and year to year. Standard square meters are calculated by multiplying the length of deposition by the width, times a weighting factor based on intensity of egg deposition (Table 1), times the percentage of the spawn area containing vegetation.

In past years, spawnings have been assigned to the various intensity categories in the field. This evaluation tended to be very subjective since it was based on the overall impressions of the thickness of the spawn and the observers' memories of past years' spawnings. As a result, considerable inconsistencies in the data occurred. In order to overcome this problem, a method was developed whereby the intensity factor was based on the actual layers of eggs deposited on the various types of vegetation (Table 2). An example of calculating the standard square meters of spawn in an area is given below.

> A deposition of 600 m by 15 m at an average thickness of 4 layers on brown algae with 60% vegetation cover is 600 x 15 x 1.4 x 0.6 = 7,560 SSM.

These numbers often become large and unwieldy for extensive spawnings, so they are converted to a base unit of 1,000 square meters; thus 7,560 SSM become 7.56 k SSM.

1983 HERRING FOOD AND BAIT FISHERY

Due to the continuing poor marketability of food herring in 1983, this fishery was limited to 1,100 tons coastwide. This total was divided between the North Coast - 275 tons and the South Coast - 825 tons, with Cape Caution being the dividing line between the two areas.

The herring food and bait fishery is basically designed to supply domestic bait requirements (i.e. halibut, dogfish, prawn, etc.) as well as fish for a small domestic secondary processing industry (i.e. pickled herring, roll-mops, kippers).

In order to facilitate a slow, orderly fishery and provide fish of the highest quality, 55-ton boat quotas were established and allocated to vessels by means of a lottery system. Any vessel with an "A" seine, "H" seine or "T" trawl licence was eligible for the draw. A total of 20 vessels were drawn, five to fish in the North Coast and 15 to fish in the South Coast. Vessels fishing in the northern area were required to deliver to processors in the north and similarly, vessels fishing in the southern area were required to deliver to processors in the south.

Guidelines for the 1983 food and bait fishery were issued to Industry in October. These guidelines provided information on export, entry and licencing requirements as well as current regulations and proposed fishing patterns (Appendix 1). Fishing in all waters was to take place on or after November 21, with individual areas opened by Public Notice as the stocks warranted.

Table 1. Herring spawn intensity categories and weighting factors used to calculate standard square meters (SSM).

Intensity category	Very light (VL)	Very Light Light (VLL)	Light (L)	Light Medium (LM)	Medium (M)	Medium Heavy (MH)	Heavy (H)	Heavy Very Heavy (HVH)	Very Heavy (VH)
Weighting factor	0.05	0.2	0.4	0.65	1.0	1.4	1.9	2.4	3.0

Table 2. Conversion from layers of herring eggs to spawn intensity categories (from Haegele et al. 1979).

Substrate	Layers of eggs								
Stringy (grasses, brown algae, stringy reds)	<0.25	0.5	1.0	2.0	3.0	4.0	6.0	7.0	7.8
Leafy (rockweed, kelp, leafy reds)	<0.25	0.5	1.0	1.5	2.0	2.5	3.0	7.5	7.4

Herring spawn intensity based on layers of eggs	Very light (VL)	Very Light Light (VLL)	Light (L)	Light Medium (LM)	Medium (M)	Medium Heavy (MH)	Heavy (H)	Heavy Very Heavy (HVH)	Very Heavy (VH)

NORTH COAST FISHERY

The area opened by Public Notice at 1200 hrs November 21, 1983. Of the five vessels licenced to fish in the northern fishery, only three actually participated. Two seines and one trawl caught fish in Eddy Pass (59 tons), Browning Entrance (59 tons) and Steamer Pass (37 tons) for a total landed catch of 155 tons.

SOUTH COAST FISHERY

Sub-areas 13-3, 17-4, 17-3 and a portion of 17-2 opened to herring fishing for food and bait at 1500 hrs on November 21, 1983. Fishing in sub-area 13-3 occurred in Deepwater Bay with three vessels taking part and hailing a catch of 165 tons. All fish were caught during the first week of the opening.

In Statistical Area 17, fishing took place in Trincomali and Stuart Channels with 10 boats fishing and hailing a catch of 537 tons. Two boats eligible to fish in the South Coast did not participate due to a lack of markets for their quotas.

In summary, during the 1983 food and bait fishery, a total of 857 tons of herring were landed coastwide. Of this total, 537 tons were caught in the lower Strait of Georgia, 165 tons in Johnstone Strait and 155 tons in the North Coast.

1984 ROE HERRING FISHERY

The roe herring area Licencing Program initiated in 1981 was continued into the 1984 season. Guidelines for the 1984 roe herring fishery are given in Appendix 2. There are three areas established by regulation: Area A (north of Cape Caution), Area B (Strait of Georgia) and Area C (West Coast Vancouver Island). Each of these areas is assigned a fixed catch quota prior to the fishing season and holders of roe herring licences are required to choose one of the areas in which to fish. The quotas are adjusted annually depending on escapement during the past year, the forcast run for next year, as well as management considerations such as catchability of the fish and gear allocation between seines and gillnets. Once the quotas have been set for the year, however, they are not changed regardless of how many fishermen choose a particular area or how many fish actually return. The three areas and the distribution of licenced gear by area for 1984 are shown in Table 3.

Table 3. Distribution of licenced gear by gear type and roe herring area, B.C., 1984.

Roe herring area	Number of licenced vessels	
	Seines	Gillnets
Area A - North of Cape Caution	120	487
Area B - Strait of Georgia	59	715
Area C - West Coast Vancouver Island	61	124
TOTAL	240[a]	1,325

[a] Seine total does not include 12 chartered seiners.

One of the major advantages of using a fixed quota is that managers can set up fisheries on the first available stock of suitable maturity, and provide for a more orderly fishery. In addition, in many areas of the coast it is the older, larger herring which spawn first, and fishing these early spawners can provide higher roe yields to the Industry.

In-season catch estimates are obtained from individual fishermen who are required to hail their catches prior to leaving the grounds. These figures are fairly accurate and generally within 10% to 15% of the final sales slip data compiled from company landing slips.

Hailed catches are given throughout the text, unless otherwise indicated, because they are the ones used to determine whether or not the quota has been realized and if the fishery should be closed or remain open. Additionally, sales slip information is not usually readily available until late in the year.

In 1984, the total quota was set to provide for a 55%:45% seine/gillnet catch division coastwide (Table 4). The anticipated quotas for each licenced area are detailed in Table 4. The actual 1984 roe herring catches are given in Table 5 (hailed catches) and Table 6 (preliminary sales slip data). The annual roe herring catches by Statistical Area and gear type are shown for the years 1981 to 1984 in Table 7 for Area A, Table 8 for Area B and Table 9 for Area C. Statistical Areas in British Columbia are shown in Figures 1 and 2, and the 1984 herring fishing boundaries in Figures 3a-j. All figures are appended at the end of the report.

Briefly, the 1984 roe herring fishery accounted for a coastwide catch of 34,315 tons (sales slip data). Of this total, 16,633 tons were caught in Area A (north of Cape Caution), 10,658 tons in Area B (Strait of Georgia), and 7,024 tons in Area C (West Coast Vancouver Island) (Table 6). The landed value of the roe herring catch in 1984 was approximately 34.3 million dollars. This compares with $48.9 million in 1983 when 40,236 tons were caught, and $27.0 million in 1982 when 29,593 tons were caught (Table 10).

A summary of the 1984 in-season stock assessment and the resultant fisheries in each area is presented below.

QUEEN CHARLOTTE ISLANDS SUB-DISTRICTS (AREAS 1, 2E, 2W)

Areas 1, 2E, 2W - Assessment

The sounding program commenced on February 26, 1984 but no sizeable stocks were observed until March 5 when 3,600 tons were located in upper Juan Perez Sound and another 1,400 tons in the Huxley Island area. A test set carried out near Huxley Island on March 6 indicated roe maturities of 11.1% and another test on the same day on the Juan Perez fish yielded 3.2% roe maturity. Stocks continued to build in the Huxley Island area and by March 9, 4,500 tons had been identified. By this time, however, roe yield tests had dropped to 7.3%.

Table 4. Anticipated roe herring catches (tons) by roe herring area, B.C., 1984.

Roe herring area	Anticipated catch (tons)[a]		
	Seines	Gillnets	Total
Area A - North of Cape Caution	10,692	6,063	16,755
Area B - Strait of Georgia	4,409	8,377	12,786
Area C - West Coast Vancouver Island	3,858	1,102	4,960
TOTAL:	18,959	15,542	34,501
Target catch division	55%	45%	

[a] For equivalent catches in metric tonnes refer to Appendix 2, Guidelines to the 1984 roe herring fishery.

Table 5. Hailed roe herring catches by gear type and roe herring area, B.C., 1984.

Roe herring area	Hailed catch (tons)		
	Seines	Gillnets	Total
Area A - North of Cape Caution	10,821	6,647	17,468
Area B - Strait of Georgia	4,438	8,325	12,763
Area C - West Coast Vancouver Island	6,000	1,226	7,226
TOTAL	21,259	16,198	37,457
Achieved catch division	57%	43%	

Table 6. Roe herring catches by gear type and roe herring area from sales slips data, B.C., 1984.

Roe herring area	Catch (tons)		
	Seines	Gillnets	Total
Area A - North of Cape Caution	10,025	6,608	16,633
Area B - Strait of Georgia	4,010	6,648	10,658
Area C - West Coast Vancouver Island	5,890	1,134	7,024
TOTAL	19,925	14,390	34,315
Achieved catch division	58%	42%	

Table 7. Annual hailed roe herring catches in Area A (north of Cape Caution) by Statistical Area and gear type, B.C., 1981-1984.

Year	Gear type[a]	Hailed catch (tons) by Statistical Area								Total Area A by gear	Overall total Area A
		1	2E	2W	3	4	5	6	7		
1981	SN	-	4,340	1,000	-	-	1,200	-	-	6,540	
	GN	-	1,732	-	-	-	410	1,437	1,099	4,678	
											11,218
1982	SN	-	2,785	1,297	-	-	-	-	2,625	6,707	
	GN	-	1,541	-	-	-	-	407	3,768	5,716	
											12,423
1983	SN	-	5,030	1,470	-	-	-	-	2,200	8,700	
	GN	-	1,100	-	-	-	-	2,500	1,500	5,100	
											13,800
1984	SN	-	5,100	-	-	-	1,835		3,886	10,821	
	GN	-	591	-	-	2,208	-		3,848	6,647	
											17,468

[a] SN - seine, GN - gillnet.

Table 8. Annual hailed roe herring catches in Area B (Strait of Georgia) by Statistical Area and gear type, B.C., 1980-1983.

Year	Gear type[a]	Hailed catch (tons) by Statistical Area					Total Area B by gear	Overall total Area B
		14	15	16	17	18		
1981	SN	3,000	-	-	-	-	3,000	
	GN	7,024	-	-	-	-	7,024	
								10,024
1982	SN	-	-	-	3,400	-	3,400	
	GN	6,000	-	-	-	-	6,000	
								9,400
1983	SN	1,600	3,200	-	1,800	-	6,600	
	GN	8,833	-	-	-	-	8,333	
								15,433
1984	SN	-	4,438	-	-	-	4,438	
	GN	8,325	-	-	-	-	8,325	
								12,763

[a] SN - seine, GN - gillnet.

Table 9. Annual hailed roe herring catches in Area C (West Coast Vancouver Island) by Statistical Area and gear type, B.C., 1981 - 1984.

Year	Gear type[a]	Hailed catch (tons) by Statistical Area 23	24	25	27	Total Area B by gear	Overall total Area B
1981	SN	3,400	-	3,000	-	6,400	
	GN	620	1,796	1,500	745	4,661	
							11,061
1982	SN	3,385	700	-	300	4,385	
	GN	-	885	2,100	400	3,385	
							7,770
1983	SN	5,100	-	-	-	5,100	
	GN	-	-	2,450	190	2,640	
							7,740
1984	SN	6,000	-	-	-	6,000	
	GN	-	-	1,026	200	1,226	
							7,226

[a] SN - seine, GN - gillnet.

Table 10. Annual landed weight and value of British Columbia roe herring catches, 1979 - 1984.[a]

Year	Landed weight (tons)	Landed value ($ million)
1979	42,807	120.86
1980[b]	19,330	22.06
1981	32,087	34.68
1982	29,593	27.01
1983	40,236	48.91
1984	34,315	34.30

[a] Used hailed catches for 1979 to 1982 and sales slip data for 1983 and 1984.
[b] Strike year.

Testing on March 11 at Dolomite Point indicated a roe maturity of 11.5% and the following morning a test made off Kat Island indicated a roe maturity of 10.9%. On March 12, only 1,500 - 2,000 tons could be located between Huxley Island and Burnaby Narrows, but it was felt that more fish were in the area and were just not showing. Roe maturities in this area had increased to 11% - 12.5%. On March 13, soundings indicated approximately 7,700 - 9,000 tons in the Juan Perez - Skincuttle Inlet area. This included 1,500 - 2,000 tons which had moved into Poole Inlet.

Areas 1, 2E, 2W - Fishery

Seines

Management sub-area 2-13, west side of Burnaby Island (Fig. 3a), opened to seines at 1410 hrs on March 12 and closed at 1501 hrs the same day. A total of 112 seines hailed a catch of 5,100 tons during the 51 minutes the area was opened. Approximately 60 sets were made and 48 vessels had an average catch of 106 tons. The largest catch made was 625 tons.

Gillnets

On March 14, four gillnet test sets were made in Poole Inlet ranging from 11.25% to 13.5% maturity. A spawning was in progress when sub-area 2-14, Poole Inlet, was opened at 1215 hrs March 14 until further notice. There were 85 gillnets operating and by 1415 hrs it was felt that the quota had been nearly reached. An announcement was made at 1430 hrs that the area would close at 1500 hrs. Due to the short notice of closure and heavy fishing, several nets were still in the water up to an hour after closure.

A catch of 591 tons from 116 deliveries was hailed during the 2 hr 45 min fishery (Fig. 3a).

NORTH COAST SUB-DISTRICTS (AREAS 3, 4, 5)

Areas 3 and 4 - Assessment

Sounding commenced on March 5, but very few fish were observed until March 10 when 500 tons were located in Somerville Bay, 400 tons in Union Inlet, 100 tons in Steamer Pass and 150 tons in Wales Pass. Three seine test sets made on March 13 at Grassy Point indicated roe maturities between 0% and 2.5%. On March 14, approximately 1,800 tons were located inside Parkin Island bringing the total stock estimate for the area to 3,400 tons. On March 15, 2,700 tons of herring were sounded between Haida Bay and Bernie Island.

On March 16, test sets were made on two large schools just inside Bernie Island. One test averaged 4.8% roe maturity and the other test averaged 5.6%. Another test made on 500 tons in Stuman Bay indicated between 3.5% and 5% roe maturity. By the following day, stocks in Stuman Bay had built up to 3,200 tons. These fish quickly moved out and by March 19, only broken schools and scratches could be found.

This year, instead of the main stock building and holding in Stuman Bay, then moving down Cunningham Pass, it moved in around both sides of Bernie Island and back out around the outside of Finlayson Island. The herring then moved south off Big Bay and held in deep water along the 50 fm contour. By March 24, an estimated 8,000 - 10,000 tons of herring were holding there.

On March 25, the main stock began to break up, with approximately 5,000 tons moving down near Hodgson Reef. Numerous smaller schools began moving into Big Bay and a small spawning began at Simpson Point. Gillnet test sets taken near Simpson Point on March 26 averaged 14% roe maturity.

Spawn progressed from Simpson Point in both an easterly and westerly direction and by March 30 was in progress between Tree Bluff Point and Slippery Rock. Smaller spawnings also took place between Burnt Cliff Island and Swallow Island.

Areas 3 and 4 - Fishery

Management sub-areas 4-5, 4-7 and 4-8 (Figs. 3b and 3c) opened to roe herring gillnet fishing at 1600 hrs March 26. There were 23 gillnets at the opening and a further 50 reported to be on the way.

Due to poor weather conditions and stocks consisting of up to 30% three-year old fish, fishing was very slow and the area did not close until 1600 hrs March 30. The hailed catch was 2,208 tons.

Area 5 - Assessment

Sounding in Kitkatla Inlet commenced on February 28, but no significant stocks were located until March 13. There was, however, a small spawning taking place at the head of Kitkatla Inlet on March 10 and 11. Between March 13 and 19, approximately 4 - 500 tons of herring were located at Robert Island and in the Wilcox Group. Roe testing on these fish indicated roe maturities averaging 10.2%. Stocks continued to build and on March 20 another test made at Snass Point yielded 12.3% roe maturity. During the same day, a test was made on fish located near Freemans Pass. These fish tested out at 9.5% roe maturity and seemed to indicate that new, less mature fish were moving into the inlet.

On the morning of March 21, sounding revealed approximately 2,000 tons on the east side of Gurd Island. Test sets at Kitkatla Creek and Gurd Point showed roe yields of 11.2% and 10.9% respectively. There were very few immature fish in these tests and it was felt that roe maturities would not increase appreciably since most of the female fish in the test were fully mature.

Stocks continued to build and by March 30, stock estimates were at 6,000 tons. Roe maturities never increased to more than 12%.

Area 5 - Fishery

Sub-area 5-5 (Fig. 3d) was opened to seine fishing at 1435 hrs on March 21. Fishing was generally slow with only a few sets exceeding 100 tons. The area was closed at 1620 hrs the same day with 118 seine vessels hailing a catch of 1,835 tons. Reported roe yields ranged from 10.4% to 12% with a few small deliveries as low as 9.3%.

CENTRAL COAST SUB-DISTRICTS (AREAS 6, 7, 8, 9, 10)

Area 6 - Assessment

No significant fish stocks were located until March 6, when 3,000 tons were sounded in Kitasu Bay. Roe tests on these fish indicated 0% maturity. By March 9, these stocks had decreased to 1,000 tons and roe testing indicated a maturity of 5.3%. By March 13, stocks in the area had increased to 3,500 tons and test sets at Wilby Point and Marvin Island showed roe maturities of 6.3% and 9.4% respectively. Stocks continued to fluctuate in abundance and on March 18, only 350 - 400 tons were sounded in the area. Roe testing at this time indicated 13.2% maturity. On March 26, stocks had increased to 1,100 tons and showed a maturity of 11.9%.

In the Higgans Pass area, 2,000 tons had been located on March 11, and testing indicated 7.4% roe maturity. By March 13, stocks dropped off and only 350 tons could be located in West Higgans Pass. These fish were tested for a roe maturity of 10.7%. A further 800 - 1,000 tons were located in east Higgans Pass at this time. On March 10, one large school of 2,000 - 2,500 tons was located in West Higgans Pass and was tested at 12.4% roe maturity. By March 25, stocks had diminished to 500 tons.

Starting on March 20, small spot spawnings were reported in progress along the west shore of Kitasu Bay, the head of Powell Anchorage, the north end of Reid Pass, west Cecilia Island and the Princess Alice Island - Houghton Island - Thompson Bay area.

Area 6 - Fishery

There was a gillnet fishery on March 27 between 1000 hrs and 0700 hrs on March 29. Fishing took place in sub-areas 6-18 (Kitasu Bay), 7-9 (Powell Anchorage - Cecilia Island - Reid Pass) and 7-19 (southeast Princess Alice Island, Fig. 3e). Parsons Anchorage and the waters within 200 m of Ivory Island shoreline were closed to protect existing spawn depositions.

A total of 317 gillnets hailed a catch of 3,848 tons with roe yields ranging between 13.5% and 15%. The Kitasu Bay area produced 748 tons, Powell Anchorage - Cecilia Island 2,488 tons and Princess Alice Island 612 tons.

Area 7 - Assessment

On March 2, 1,000 tons were located in Stryker Bay and 2,700 tons in the vicinity of Clarie Island. Within the next few days, the stocks at Clarie Island had decreased to 1,300 - 1,400 tons.

Assessments on March 7 at Waskesiu Pass revealed an estimated 1,000 tons and this estimate rose to 1,600 tons by next day. Soundings in the Waskesiu Pass fluctuated between 250 and 1,000 tons over the next week.

On March 12, 300 tons were located in Berry Inlet. This estimate increased to 1,500 tons by March 13, and 2,000 tons by March 15. In addition, assessments in Powell Anchorage estimated 2,500 - 2,800 tons with a minor spawn taking place. Testing on these fish indicated 10.7% to 13.9% roe maturity. Tonnage remained unchanged during the following week.

By March 23, stocks in Powell Anchorage had declined to 1,000 - 1,500 tons, but began to build over the next four days and by March 26, were estimated to be around 4,000 tons.

In east Higgans Pass, an estimated 1,500 - 2,000 tons were reported on March 16. Two tests on these fish averaged 10.9% and 11.7% roe maturity. These stocks declined to 1,100 tons on March 17 and were mainly comprised of small broken schools throughout the east Higgans Pass. Stocks remained in the 1,000 - 1,500 ton range until March 26 when only 700 - 800 tons could be located. Testing at this time showed 11.5% roe maturity.

Build-up of stocks in the previous seine areas (Stryker Bay - Thompson Bay) did not occur this year. In addition, there was no major spawning, but a series of "trickle spawns" occurring over a long period of time.

Area 7 - Fishery

A seine fishery took place on March 16 from 1220 hrs to 1630 hrs in sub-area 7-3, east Higgans Pass (Fig. 3e). A compliance boundary between Aldrich Point and Jorkins Point was in effect. There were 120 seines operating of which 63 caught fish for a hailed catch of 3,076 tons. The area was reassessed overnight and reopened the next day from 1235 hrs to 1310 hrs. The 115 seines present at the second opening hailed a catch of 810 tons. The total seine catch for both openings was 3,886 tons. Roe yields ranged between 11% and 12%.

MIDDLE EAST COAST SUB-DISTRICTS (AREAS 13, 14, 15, 16)

Area 13 - Assessment

Test fishing and assessment began in the area on February 20. However, very few fish were observed in the area until March 1 when 8,000 tons were sounded in Deepwater Bay - Kanish Bay. That same day, 2,000 tons of fish were also reported in the Okisollo Channel. By March 8, stocks in Okisollo Channel had increased to 3,000 tons and had decreased in Deepwater Bay to 2,000 tons.

On March 10, 4,000 - 5,000 tons were located off Rebecca Spit. A test set in Deepwater Bay on March 11 indicated small fish with an average size of 17.8 cm.

On March 15, a spawning was in progress from Francisco Point to Cape Mudge and by March 20, spawnings were occurring in Hyacinthe Bay and Lower Quadra Island. There was no roe herring fishery in Area 13.

Area 14 - Assessment

Pre-season stock assessment commenced on February 17, but it was not until February 21 that any appreciable build-up of herring took place. At this time, 500 - 1,000 tons were located in Deep Bay and a further 3,000 tons were located off Komas Bluff in Lambert Channel. Total tonnage in the area remained constant over the next few days. On February 27, a test made at Phipps Point in upper Lambert Channel indicated a roe maturity of 4.0% and another test at Repulse Spit in Deep Bay indicated a roe maturity of 4.5%. On February 28, total assessment for this area was approximately 4,000 tons and a test set made off Komas Bluff yielded 9.6% roe maturity. These fish appeared to have abnormally small gonads and there was concern over the potential of having a commercial seine fishery in the area.

On February 29, three test sets made off Denman Island in Lambert Channel ranged in roe maturity between 7% and 9%. Stock assessment on March 2 indicated 3,000 - 4,000 tons in this area with 2,000 tons estimated to be in Upper Baynes Sound. On March 3, a spawning took place between Little Qualicum River and Big Qualicum River. Gillnet tests made in this locality indicated a roe maturity between 10.5% and 14%. By March 4 and 5, substantial schools of herring were moving into the beaches and shallows off Komas Bluff and in Tribune Bay. Soundings in Upper Baynes Sound on March 7 located 2,000 tons and were tested for a roe maturity of 11.6%. Spawning commenced during the evening of March 7 and by the morning of March 8, a significant spawn was in progress in Tribune Bay. At this time, an additional 5,000 tons of what appeared to be new fish were located in Lambert Channel. These fish were tested and showed roe maturity of 12.4%. On March 14, approximately 10 km of spawn were observed at Hornby Island from Helliwell Park to Fords Cove and another 3 km of spawn were deposited on the Denman Island shoreline at Fillongley Park.

Area 14 - Fishery

The gillnet fishery opened on March 9 at 0700 hrs in sub-areas 14-1, 14-4, 14-5, 14-7, 14-9 and 17-16 (Fig. 3f). Due to the dispersement of the stocks, the majority of fishing gear was concentrated in Tribune Bay. The area was closed to roe herring fishing at 1330 hrs March 10 to assess the catch. The hailed catch from the 650 vessels participating was 6,000 tons. This was a shortfall of the quota by about 2,300 tons. A second opening took place in sub-area 14-10 on March 11 between 0800 hrs and 1300 hrs. The hailed catch from this opening was 2,325 tons, bringing the total hailed catch for the area to 8,325 tons.

Area 15 - Assessment

On February 23, approximately 3,000 tons were located off Westview. These were tested and yielded 1.5% roe maturity. Stocks continued to build and by February 28, estimates ranged between 7,000 and 9,000 tons in the Grief Point - Sliammon area. Roe testing indicated 5.8% maturity. The following day, the main body of fish was observed moving eastward towards Stillwater. Samples taken during the evening of February 29 yielded 6.6% roe maturity.

On March 1, 5,000 tons were located between Grief Point and Sliammon. Samples taken off the Powell River Mill on March 2 had an average roe maturity of 10.6%. A further 3,000 tons were located between Myrtle Point and Scotchfir Point. A test was made off Thunder Point and the fish showed a 7.4% roe maturity.

On March 8 and 9, a spawning took place on the south east side of Harwood Island and on March 12 a report was received that a major spawning was in progress on the south east side of Savory Island.

Area 15 - Fishery

A seine fishery took place in sub-area 15-2 (Fig. 3g) on March 2 between 1102 hrs and 1248 hrs in the vicinity of Scuttle Point, Harwood Island and Powell River Mill. A total of 59 seines hailed a catch of 650 tons before the area was closed due to disbursement of stocks. At the closure, the fish were broken into small, fast moving, scattered schools and there was a concern that roe maturity may drop due to mixing with less mature fish.

A second seine opening took place in sub-area 15-2 on March 4 from 0847 hrs to 1315 hrs. Fishing boundaries were from Powell River Mill to Harwood Island to Atrevida Reef. The hailed catch for this opening was 3,788 tons, bringing the total catch for Area 15 to 4,438 tons.

LOWER EAST COAST SUB-DISTRICT (AREAS 17, 18)

Area 17 - Assessment

Assessments on February 22 indicated 4,000 - 4,500 tons off Porlier Pass in Trincomali Channel. These stocks increased rapidly and by February 25 were estimated to be around 15,000 tons. Roe testing indicated 0.7% maturity. A further 1,000 tons were located in Phylades Channel. By February 29, total stocks in Phylades Channel had increased to 8,000 tons and sampling indicated roe maturities of 0.8% to 1.0%.

In Nanoose Bay, 8,000 tons had been located in the Maude Island area during the last week of February. On March 2, 4,000 - 5,000 tons were reported just outside the entrance to Nanoose Harbour. Some of these fish began breaking off during the night and moved to the Lantzville shoreline. Approximately 1,000 - 2,000 tons moved into the bay during the night and were tested for a roe maturity of 8.8%. The fish tested outside Nanoose showed 5.5% roe maturity.

On March 4, 3,000 - 4,000 tons were located between Maude Island and Nanoose Bay. These fish were tested at 10.2% roe maturity. On March 5, the fish disappeared completely but returned to the area during the early morning hours of March 6. By March 8, 3,000 tons were assessed in Nanoose Bay and were tested at 12.1% roe maturity. During the evening, these fish moved outside the bay towards Maude Island.

In the lower portion of Area 17, Trincomali and Stuart Channels, 12,000 - 15,000 tons were assessed on March 7, and there seemed to be a slow northward movement of these fish. Samples taken on March 10 in Stuart Channel on 5,000 tons of herring indicated a roe maturity of 11.2%. These fish were beginning to move towards the Vancouver Island shoreline and on March 16, spawning was observed at Kulleet Bay.

LOWER WEST COAST VANCOUVER ISLAND SUB-DISTRICTS (AREAS 23, 24)

Area 23 - Assessment

The stock assessment program began on February 23, but no significant body of fish was found in the area until February 27. At this time, 3,500 - 4,000 tons were located between Chrow Island and Forbes Island. Poor weather conditions hampered the sounding program, and by February 28 the fish had broken up into numerous small schools throughout the area. During the evening of February 29, approximately 2,000 - 2,500 tons were situated in the "deep hole" off Chrow Island. Testing on these fish yielded an average roe maturity of 8.1%. Over the course of the next few days, the fish seemed to be moving in towards Forbes Island and could be seen in dense schools holding tight to the bottom throughout Macoah Pass. On March 4, there were 500 - 800 tons off the George Fraser Islands and 700 - 800 tons around Stopper Island in Macoah Pass. The Stopper Island fish showed 11.25% roe maturity.

By March 5, there were an estimated 3,000 tons in the Macoah Pass area and in excess of 5,000 tons in the entire Statistical Area 23. A test taken March 5 off David Island averaged 12.2% roe maturity. By March 6, the fish had begun to move back out towards Chrow Island and soundings throughout the Stopper Island - St. Innis Island - Spilling Islets area could only locate a few scratches of fish. During the evening of March 7, 1,500 - 2,000 tons were situated between Chrow Island and Beg Island and a further 1,000 tons were reported in Newcombe Channel between Food Islets and Twin Rivers. A test made off Twin Rivers indicated roe yield of 11.1%.

On March 9, the fish were concentrated in two large schools between Chrow Island and Beg Island. A test on one of the schools indicated roe maturity of 11.5%. Soundings between Chrow Island and Forbes Island located only a few small schools.

Over the next few days, about 1,000 - 2,000 tons were located in the Newcombe Channel - Macoah Pass area and on March 11, there were 700 - 1,000 tons around Beg Island, 700 - 900 tons in Macoah Pass and 1,000 tons in Pipestem Inlet. Testing on the fish in Pipestem Inlet on March 13 indicated roe maturity of 13%. On March 14, a spawning took place along the Forbes Island shoreline.

Area 23 - Fishery

A seine fishery took place in sub-areas 23-8, 23-9 and 23-10 (Fig. 3h) on March 8 between 1308 hrs and 1452 hrs. The 61 seines present at the opening hailed a catch of 6,000 tons. Tests made prior to the opening indicated roe maturities of 11.25%.

Area 24 - Assessment

On February 14, a total of 500 tons of herring were located in the Lower Clayoquot Sound area. Of this, 200 tons were in the Bawden Bay - White Pine Cove area, 100 tons along the east shore of McNeil Peninsula and 200 tons in Hecate Bay. Stock abundance remained consistently very low over the entire assessment period between February 24 and March 18, and only small scattered schools were observed throughout the area. At no time was there any major build-up of stocks in this area. The first spawning occurred on March 8 in the Elbow Bank - McIntosh Bay area and continued sporadically over the next 16 days.

An assessment program was also carried out in the Sidney Inlet - Shelter Inlet area and during the evening of February 24, approximately 2,000 tons were located in the lower portion of Sidney Inlet. A test made off Starling Point indicated a roe maturity of 7.3% and another test made in the same locality on February 28 showed that the roe maturity had increased to 11.5%. During the assessment period, these fish would characteristically disappear over the Sidney Bar, and reappear a day or so later in scattered schools.

Soundings on March 5 located a good showing of fish outside Steamer Cove with estimates in the 500 - 600 ton range. Further sounding in the Sidney Bar area located 150 - 200 tons just south of Sharp Point. On March 6, there was a considerable amount of bird activity all along the bluffs at Hootla-Kootla suggesting a possible spawning. There was no confirmation of this due to the heavy swell hitting the shoreline.

Soundings during the evening of March 6 in Sidney Inlet showed numerous small surface scratches that looked like spawned out fish.

On March 8, a spawning did occur in Hesquiat Harbour; it was felt that the fish that had been holding in Sidney Inlet moved into Hesquiat to spawn. Total stock in Area 24 was thought never to have exceeded 4,000 tons. This included both the upper and lower portions of Area 24.

UPPER WEST COAST VANCOUVER ISLAND SUB-DISTRICTS (AREAS 25, 26, 27)

Area 25 - Assessment

Hootka Sound

Stock assessment began on February 25, 1984 but due to adverse weather conditions, assessment was limited to inside waters. A survey of both

Zuciarte and Cook Channels produced an estimate of less than 100 tons. By March 2, 1984, the weather had moderated and the survey area was extended to include Bajo Reefs and along the shoreline to Escalante Point. Total estimate for the area remained at 100 tons.

On March 5, 1984, several schools ranging from 30 to 100 tons, were observed moving along the south west shoreline of Zuciarte Channel. These fish moved very fast and held tight to the shoreline when disturbed by the assessment vessel. A 100-ton school located between Nootka Light and Pantoja Islands was tested for a roe maturity of 10.4%. The fish in the sample were very small with 84% being less than 190 mm in standard length and were very likely three-year old, first year spawners.

Total stock estimates increased to 600 - 700 tons on March 7. Periodic assessments conducted between March 12 and March 30 indicated no further increase in stocks.

Esperanza Inlet

An early assessment survey conducted on February 10, estimated approximately 1,500 tons in the area. Subsequent surveys between February 10 and February 23, however, could not locate any stocks. On February 24, several schools ranging from 5 to 500 tons, were located throughout the inlet and total estimate for the inlet was approximately 700 tons. This estimate increased to 1,000 - 1,500 tons the next day, but decreased to 200 tons by February 26. The decrease in stocks was thought to have been due to poor weather conditions causing the fish to move offshore into deeper waters. Weather hampered the sounding program over the next few days, but on March 1, a break in the weather allowed a survey of the entire area. Only 200 tons could be located in both Nuchatlitz and Port Langford. A spawning had begun in Port Langford along the western shoreline as well as in the Inner Nuchatlitz, but an assessment carried out using spawn rakes showed very few eggs being deposited. On March 4, total stock strength increased to 1,200 - 1,500 tons. A gillnet test fishery conducted in both Nuchatlitz Inlet and Port Langford indicated good quality fish, but with a high male to female sex ratio. Roe maturities obtained from gillnet samples ranged between 5% and 17% with an average of 8% to 10%.

Stocks continued building and on March 5 were estimated to be between 2,500 and 3,000 tons. Spawning continued throughout the Nuchatlitz - Port Langford areas until March 7, 1984.

Area 25 - Fishery

The gillnet fishery at Esperanza - Nuchatlitz opened from 1100 hrs until 2000 hrs on March 5 in sub-areas 25-13 and 25-14 (Fig. 3i). Approximately 95 gillnets participated and hailed a catch of 1,026 tons. Catches were tested at 11% to 14% roe maturity.

Area 27 - Assessment

No significant body of fish was observed in the area until March 3 when 1,000 tons were sounded in Winter Harbour. Stocks continued to build and by March 5, 3,000 tons had moved into the area. Gillnet tests showed roe yields between 11% and 12%. On March 10, a spawning was observed in Winter Harbour.

Area 27 - Fishery

Winter Harbour, sub-area 27-3 (Fig. 3j), opened to gillnets on March 3 at 2200 hrs and closed at 0700 hrs on March 6. The 14 gillnets participating hailed a catch of 200 tons. Testing of catches indicated roe yields of 12% to 14%.

1984 SPAWN-ON-KELP FISHERY

Spawn-on-kelp harvesting has been permitted by regulation in British Columbia since 1975. There are, at present, 28 licences issued on an annual basis to either individuals or Native Indian Bands, and each licence authorizes the production of 7,250 kg of processed product.

Until 1983, the method used to obtain the product involved seining sexually mature herring, towing them to a sheltered bay and releasing them into floating pens. These floating pens were constructed out of log frames from which seine web was suspended to form an enclosure. The pond frames were anchored to the bottom and/or tied to the shore. Good quality kelp (Macrocystis integrifolia) was harvested from nearby locations and approximately 1.8 m lengths of kelp were tied to weighted lines which were then suspended in the ponds.

Once the herring have spawned on the kelp (1-10 days) the product was harvested and sent to processing plants in regulation totes. Shields and Kingston (1982) documented in detail the spawn-on-kelp fishery in the Queen Charlotte Islands and northern B.C. coast. Their study revealed two major problems with this type of fishery: a high rate of mortality occurred among the impounded herring, and in 12 out of 18 ponds observed, the percentage of spawned out females was never greater than 50%.

This finding resulted in a considerable amount of concern about the biological integrity and efficiency of this fishery and lead to the development of the "open ponding" method now used mainly in the Queen Charlotte Islands. This method, described in detail by Shields and Watson (1983), basically involves suspending kelp fronds in an area where active spawning is in progress. This method has two advantages in that there is no handling of the herring, which eliminates injury or mortality, and almost all the fish spawn since spawning occurs in a natural state.

Preliminary production figures indicate that in 1984 a total of 170,413 kg of product were harvested for an average of 6,086 kg per licence. This

compares with 224,724 kg harvested in 1983, 174,810 kg in 1982 and 191,145 kg in 1981. In 1984, the distribution of licences by area was as follows:

1. Queen Charlotte Islands - 11 licences
2. North Coast - 8 licences
3. Central Coast - 4 licences
4. Strait of Georgia - 3 licences
5. West Coast Vancouver Island - 2 licences

All licence holders operating in the Queen Charlotte Islands used the open pond method, while all other areas used the impoundment method.

1984 HERRING SPAWN SUMMARY

A total of 9.5 million standard square meters (SSM) of spawn were recorded for the British Columbia coastline during 1984 (Tables 11 and 12). This represents a 39% decrease from the 15.6 million SSM recorded in 1983 (Table 12).

North of Cape Caution, the Queen Charlotte Islands showed an increase over the previous year, while both the Port Simpson/Porcher Island area and Central areas showed a sharp decline.

In the South Coast, the Strait of Georgia showed a dramatic decrease over 1983 and was well below average in all areas. The West Coast of Vancouver Island was also well below average in all areas except Area 24 which was above the 1982 and 1983 levels.

The following is a summary of spawnings by herring roe district. Herring spawn depositions are shown by Statistical Area in Table 11 for northern B.C. and in Table 12 for southern B.C. Individual 1984 herring spawnings are listed in Table 13 at the end of this section.

QUEEN CHARLOTTE ISLANDS SUB-DISTRICTS (AREAS 1, 2E, 2W)

A total of 1,878.5 SSM of spawn were recorded for the Queen Charlotte Islands during 1984. This was slightly above the 1981-83 average of 1,744.1 SSM. The 1,669.7 SSM of spawn recorded for Area 2E in 1984 were well above the 1981-83 average of 1,024.1 SSM. The majority of the spawn occurred in the Skincuttle Inlet/Juan Perez Sound area, mainly in Poole Inlet, Jedway Bay, Huston Inlet and Alder Island/Huxley Island areas. There was no spawn recorded in Atli Inlet this year and both Selwyn and Cumshewa Inlets had considerably less spawn than in 1983. The deposition of 208.9 SSM of spawn in Area 2W in 1984 was well below the 1981-83 average of 439.5 SSM.

Table 11. Standard square meters (SSM x 1000) of herring spawn deposited in northern British Columbia by herring district and Statistical Area, 1981-1984.

Area	1981	1982	1983	1984	(3-year average) 1981-1983
Queen Charlotte Islands					
1	39.36	110.82	1.54	-	50.57
2E	1,517.98	1,223.57	1,020.71	1,669.66	1,254.09
2W	211.71	550.55	556.08	208.87	439.45
	1,769.05	1,884.94	1,578.33	1,878.53	1,744.11
North Coast					
3	291.16	28.18	49.05	77.42	122.80
4	565.36	727.02	1,765.60	1,604.17	1,019.33
5	410.23	359.58	864.14	429.20	544.65
	1,266.75	1,114.78	2,678.79	2,110.79	1,686.78
Upper Central Coast					
6	490.06	423.94	660.25	396.71	524.75
Lower Central Coast					
7	1,072.67	1,544.98	1,058.96	448.00	1,225.54
8	164.40	190.32	168.52	174.59	174.41
9	2.86	54.02	11.32	3.34	22.73
10	13.91	181.76	54.21	144.92	83.29
	1,253.84	1,971.08	1,293.01	770.85	1,505.97
Total North Coast	**4,779.70**	**5,394.74**	**6,210.38**	**5,156.88**	**5,461.61**

Table 12. Standard square meters (SSM x 1000) of herring spawn deposited in southern British Columbia by herring district and Statistical Area, 1981-1984.

Area	1981	1982	1983	1984	(3-year average) 1981-1983
Upper East Coast					
11	0.82	-	2.99	0.88	1.27
12	217.37	167.27	72.16	206.81	152.27
	218.19	167.27	75.15	207.69	153.54
Middle East Coast					
13	272.53	480.69	617.16	5.78	456.79
14	2,205.83	6,195.81	3,325.83	616.07	3,909.16
15	848.98	1,234.10	537.46	738.29	873.51
16	0.44	10.80	-	-	3.75
	3,327.78	7,921.40	4,480.45	1,360.14	5,243.21
Lower East Coast					
17	1,085.64	2,173.27	1,819.72	959.18	1,692.88
18	114.08	37.42	7.50	-	53.00
	1,199.72	2,210.69	1,827.22	959.18	1,745.88
Lower West Coast					
23	426.42	291.81	928.11	286.19	548.78
24	1,792.94	168.64	181.36	1,107.74	714.31
	2,219.36	460.45	1,109.47	1,393.93	1,263.09
Upper West Coast					
25	625.80	720.36	561.15	160.78	635.77
27	1,173.12	722.23	1,378.69	293.08	1,091.35
	1,798.92	1,442.59	1,939.84	453.86	1,727.12
Southern Mainland					
29	-	-	-	3.11	-
Total South Coast	8,763.97	12,202.40	9,432.13	4,377.91	10,132.84
COASTWIDE	13,543.67	17,597.14	15,642.51	9,534.79	15,594.45

Although spawnings were observed to have taken place in Naden Harbour (Area 1) this year, there was no assessment program carried out due to lack of manpower and operational days.

NORTH COAST SUB-DISTRICTS (AREAS 3, 4, 5)

The North Coast remained well above average in 1984 with a total of 2,110.8 SSM of spawn recorded. The Area 4 spawning accounted for the largest portion with a total of 1,604.2 SSM. The 429.2 SSM of spawn recorded in Area 5 represented a 50% reduction from the 1983 level of 864.1 SSM. Area 3 was still below average with only 77.4 SSM of spawn recorded in 1984; however, there has been a steady increase over the last two years.

CENTRAL COAST SUB-DISTRICTS (AREAS 6, 7, 8, 9, 10)

The downward trend in spawn deposition continued in 1984. The 770.9 SSM of spawn recorded in the lower central region (Areas 7, 8, 9, 10) represented a 49% reduction from the 1981-83 average of 1506.0 SSM, and the 396.7 SSM of spawn recorded for the upper central region (Area 6) represented a 24% reduction from the 1981-83 average of 524.8 SSM. Area 7 showed the largest reduction, dropping from 1,545.0 SSM in 1982 to 1,059.0 SSM in 1983 and 448.0 SSM in 1984.

In 1984, the largest spawning took place in the Cecilia Island/Powell Anchorage area, followed by Stryker Bay. Spiller Channel which in 1983 had the largest spawning followed by Joassa Channel was this year at 25% of the 1983 level. Spawnings in the McNaughton Island, Clutus Sound and Spider Anchorage areas also appeared to be declining.

In Area 6, spawnings were well below average with only 396.7 SSM recorded in 1984. The major spawning occurred in Weeteeam Bay and Kitasu Bay with a minor spawning taking place in West Higgins Pass. There were no other spawnings recorded for Area 6.

Area 8 was slightly above the 1983 level, while Area 9 (Rivers Inlet) was very poor and Area 10 (Smith Inlet) had a better than average spawn record.

UPPER EAST COAST SUB-DISTRICTS (AREAS 11, 12)

There was a sharp increase in spawn observed in 1984 and the 207.7 SSM recorded there were well above the 75.2 SSM recorded in 1983. Virtually all the spawning took place in Area 12 with only 0.9 SSM recorded in Area 11.

MIDDLE EAST COAST SUB-DISTRICTS (AREAS 13, 14, 15, 16)

The dramatic decline in spawn that began in 1983 continued in 1984. Only 1,360.1 SSM of spawn were recorded for this district, which represents a 70% reduction from the 4,480.5 SSM recorded in 1983. In Area 13, spawnings dropped from 617.2 SSM in 1983 to 5.8 SSM in 1984. The only spawning recorded in the area took place in Deepwater Bay. Area 14 declined from 3,325.8 SSM in

1983 to 616.1 SSM in 1984, and showed one of the poorest spawnings on record. Area 15 showed a slight improvement, increasing from 537.5 SSM in 1983 to 738.3 SSM in 1984, but was still below the 1981-83 average of 873.5 SSM. There were only two main spawning locations in Area 15 in 1984, one along the south east shore of Harwood Island and the other along the south east shore of Savary Island.

LOWER EAST COAST SUB-DISTRICTS (AREAS 17, 18)

Spawnings in the lower east coast were well below average with only 959.2 SSM recorded. This was well below the 1,827.2 SSM recorded in 1983. All of the spawning took place in Area 17 and the majority occurred between Yellow Point and Sharpe Point in Stuart Channel. Lesser spawns occurred at Degnan Bay and Nanoose Bay. There were no spawnings recorded in Area 18 in 1984.

LOWER WEST COAST VANCOUVER ISLAND SUB-DISTRICTS (AREAS 23, 24)

A total of 1,393.9 SSM of spawn were recorded for this area representing a slight improvement over the 1,109.5 SSM recorded in 1983. Area 23 showed a sharp decline, dropping from 928.1 SSM in 1983 to 286.2 SSM in 1984, and was well below the 1981-83 average of 548.8 SSM. All spawnings took place in Macoah Pass between Forbes Island and Twin Rivers. This is a reversal of the pattern exhibited over the past few years when spawn depositions occurred more towards the entrance of Barkley Sound; in fact, the bulk of the spawning in 1983 took place in Ucluelet Harbour.

Area 24 had a fairly good spawning compared to Area 23, with 1,107.7 SSM recorded. This was well above the 1981-83 average of 714.3 SSM. It should be noted that this does not include spawning that occurred in Hesquiat Harbour where no assessment surveys were carried out due to inclement weather conditions. The major spawning locations in Area 24 included Yellow Bank, Elbow Bank, Ritchie Bay and Hotsprings Cove.

UPPER WEST COAST VANCOUVER ISLAND SUB-DISTRICTS (AREAS 25, 26, 27)

Spawnings in the Upper West Coast areas were extremely poor with only 453.9 SSM of spawn recorded. In 1983, 1,939.8 SSM were recorded and the 1981-83 average was 1,727.1 SSM. Esperanza Inlet had one of the worst spawnings on record with only 160.8 SSM of spawn recorded. There was no spawn recorded for Nootka Sound this year.

Area 27 also exhibited a drastic decline in spawn dropping from 1,378.7 SSM in 1983 to 293.1 SSM in 1984.

Table 13. Summary of individual herring spawnings, B.C., 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 2W, WEST COAST Q.C.I.							
INSKIP CHANNEL	06/04	06/04	1000	30	6	0.00	42.00
INSKIP CHANNEL	06/04	06/04	3000	5	7	0.10	25.65
INSKIP CHANNEL	06/04	06/04	800	5	7	0.10	6.84
INSKIP CHANNEL	06/04	06/04	550	5	7	0.10	4.70
LOUSCOONE INLET	06/03	06/03	1000	12	5	0.50	6.00
LOUSCOONE INLET	06/03	06/03	1300	10	4	0.70	2.54
LOUSCOONE INLET	06/03	06/03	550	5	2	0.70	0.17
NEWCOMBE INLET	07/04	07/04	1100	9	5	0.10	8.91
NEWCOMBE INLET	07/04	07/04	660	6	5	0.10	3.56
PORT CHANAL	23/03	23/03	400	8	7	0.00	6.08
PORT CHANAL	23/03	23/03	900	8	7	0.00	13.68
PORT CHANAL	23/03	23/03	500	6	5	0.00	3.00
PORT LOUIS	04/03	08/03	200	3	3	0.25	0.18
PORT LOUIS	04/03	08/03	750	8	5	0.10	5.40
PORT LOUIS	04/03	08/03	700	8	5	0.30	3.92
PORT LOUIS	04/03	08/03	150	3	3	0.25	0.14
PORT LOUIS	04/03	08/03	1000	8	4	0.20	4.16
PORT LOUIS	04/03	08/03	550	5	1	0.20	0.11
PORT LOUIS	04/03	08/03	750	70	6	0.30	51.45
PORT LOUIS	04/03	08/03	250	30	3	0.70	0.90
PORT LOUIS	04/03	08/03	1200	10	4	0.70	2.34
PORT LOUIS	04/03	08/03	200	100	3	0.40	4.80
PORT LOUIS	04/03	08/03	550	8	5	0.30	3.08
PORT LOUIS	04/03	08/03	400	8	3	0.40	0.77
PORT LOUIS	04/03	08/03	250	5	3	0.25	0.38
RENNELL SOUND	21/03	21/03	5000	5	4	0.50	8.12
AREA TOTAL			23710.				208.87
AREA: 2, EAST COAST Q.C.I.							
ALDER ISLAND	26/03	30/03	200	15	5	0.30	2.10
ALDER ISLAND	26/03	30/03	150	10	7	0.20	2.28
ALDER ISLAND	26/03	30/03	350	2	5	0.50	0.35
ALDER ISLAND	26/03	30/03	200	15	6	0.50	2.10
ALDER ISLAND	26/03	30/03	800	50	8	0.40	57.60
ALDER ISLAND	26/03	30/03	275	2	4	0.70	0.11
ALDER ISLAND	26/03	30/03	220	12	7	0.10	4.51
ALDER ISLAND CREEK	27/03	28/03	400	30	6	0.10	15.12
ALDER ISLAND CREEK	27/03	28/03	400	10	7	0.80	1.52

Table 13 (contd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 2, EAST COAST Q.C.I. CONTINUED							
ALDER ISLAND CREEK	27/03	28/03	200	2	8	0.30	0.67
ALDER ISLAND CREEK	27/03	28/03	650	45	5	0.25	21.94
BARGE POINT	15/04	15/04	20	20	6	0.05	0.53
BEATTIE ANCHORAGE	24/05	24/05	15	4	5	0.00	0.06
BEATTIE ANCHORAGE	10/05	10/05	1500	4	5	0.10	5.40
BEATTIE ANCHORAGE	27/04	27/04	150	15	2	0.75	0.11
BEATTIE ANCHORAGE	24/05	24/05	175	4	6	0.10	0.88
BEATTIE ANCHORAGE	24/05	24/05	150	8	2	0.50	0.12
BURNABY ISLAND	27/03	28/03	175	15	7	0.40	2.99
BURNABY ISLAND	27/03	28/03	200	10	6	0.25	2.10
BURNABY ISLAND	27/03	28/03	600	5	6	0.10	3.78
BURNABY ISLAND	27/03	28/03	200	8	6	0.20	1.79
BURNABY ISLAND	27/03	28/03	250	5	9	0.00	3.75
BURNABY ISLAND	27/03	28/03	600	2	5	0.25	0.90
BURNABY STRAIT	08/03	08/03	400	20	4	0.15	4.42
CONGLOMERATE POINT	26/03	27/03	600	15	5	0.50	4.50
CONGLOMERATE POINT	26/03	27/03	900	15	5	0.25	10.13
CONGLOMERATE POINT	26/03	27/03	600	15	7	0.00	17.10
CONGLOMERATE POINT	26/03	27/03	600	15	4	0.30	4.09
DAVEY ISLETS	25/03	25/03	50	30	3	0.20	0.48
DAVEY ISLETS	25/03	25/03	800	30	4	0.20	12.48
FLOWERY ISLAND	14/05	15/05	300	4	2	0.00	0.24
FLOWERY ISLAND	14/05	15/05	25	10	5	0.00	0.25
HAIDA POINT	25/04	30/04	100	5	4	0.20	0.26
HAIDA POINT	19/04	19/04	35	50	6	0.00	2.45
HAIDA POINT	26/04	29/04	300	5	2	0.25	0.23
HAIDA POINT	17/04	17/04	300	15	5	0.00	4.50
HAIDA POINT	26/04	29/04	800	5	2	0.75	0.20
HAIDA POINT	25/04	30/04	10	5	4	0.10	0.03
HAIDA POINT	17/04	17/04	250	12	4	0.05	1.85
HARRIET HARBOUR	26/03	31/03	350	50	8	0.40	25.20
HUSTON INLET	26/03	31/03	540	35	7	0.15	30.52
HUSTON INLET	14/03	14/03	60	10	5	0.00	0.60
HUSTON INLET	26/03	31/03	1260	20	5	0.70	7.56
HUSTON INLET	26/03	30/03	540	30	5	0.55	7.29
HUSTON INLET	12/03	12/03	20	5	5	0.00	0.10
HUSTON INLET	26/03	31/03	30	30	3	0.70	0.11
HUSTON INLET	26/03	30/03	270	35	4	0.50	3.07
HUSTON INLET	12/03	12/03	40	20	5	0.00	0.80
HUSTON INLET	12/03	12/03	100	60	4	0.15	3.32
HUSTON INLET	12/03	12/03	20	5	5	0.00	0.10
HUSTON INLET	12/03	12/03	600	35	5	0.20	16.80
HUSTON INLET	26/03	30/03	2790	20	6	0.50	39.06
HUSTON INLET	12/03	12/03	100	75	5	0.15	6.38
HUXLEY ISLAND	29/03	31/03	600	30	7	0.15	29.07

Table 13 (contrd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 2, EAST COAST Q.C.I. CONTINUED							
HUXLEY ISLAND	29/03	31/03	60	6	2	0.50	0.04
HUXLEY ISLAND	29/03	31/03	400	18	5	0.90	0.72
HUXLEY ISLAND	29/03	31/03	200	3	2	0.25	0.09
HUXLEY ISLAND	29/03	31/03	10	3	3	0.60	0.00
HUXLEY ISLAND	30/03	04/04	1260	30	8	0.50	45.36
HUXLEY ISLAND	29/03	31/03	100	10	5	0.00	1.00
IMAGE POINT	25/04	30/04	175	20	6	0.00	4.90
IMAGE POINT	25/04	30/04	100	7	7	0.00	1.33
JEDWAY	26/03	30/03	900	50	7	0.30	59.85
JEDWAY	15/03	18/03	700	100	6	0.10	88.20
JEDWAY	24/03	27/03	300	100	6	0.50	21.00
JEDWAY	24/03	27/03	300	25	7	0.50	7.13
JEDWAY	26/03	30/03	720	30	8	0.30	36.29
KILMINGTON POINT	12/04	14/04	800	10	7	0.00	15.20
KILMINGTON POINT	12/04	14/04	275	20	6	0.00	7.70
KILMINGTON POINT	12/04	14/04	1800	15	8	0.00	64.80
KILMINGTON POINT	12/04	14/04	220	25	8	0.00	13.20
KILMINGTON POINT	12/04	14/04	250	9	5	0.00	2.25
KWUNA POINT	11/05	11/05	50	5	2	0.75	0.01
KWUNA POINT	04/05	04/05	100	10	3	0.50	0.20
MAUDE ISLAND	12/05	14/05	300	15	4	0.15	2.49
MAUDE ISLAND	12/05	14/05	360	15	3	0.10	1.94
MAUDE ISLAND	12/05	14/05	75	4	3	0.00	0.12
MAUDE ISLAND	12/05	14/05	200	4	3	0.20	0.26
MCMILLAN CREEK	07/05	12/05	300	15	4	0.35	1.90
NORTH END DANA PASS	14/04	14/04	100	4	5	0.00	0.40
PACOFI BAY	15/04	15/04	300	4	3	0.00	0.48
POOLE INLET	13/03	22/03	540	10	5	0.15	4.59
POOLE INLET	13/03	22/03	1640	50	7	0.85	23.37
POOLE INLET	13/03	22/03	50	20	3	0.30	0.28
POOLE INLET	13/03	22/03	140	10	5	0.50	0.70
POOLE INLET	13/03	22/03	170	40	8	0.70	4.90
POOLE INLET	13/03	22/03	1100	10	5	0.30	7.70
POOLE INLET	13/03	22/03	900	10	4	0.50	2.92
POOLE INLET	13/03	22/03	180	180	7	0.10	55.40
POOLE INLET	13/03	22/03	450	30	6	0.35	12.29
POOLE INLET	13/03	22/03	800	10	7	0.05	14.44
POOLE INLET	13/03	22/03	730	20	6	0.20	16.35
POOLE INLET	13/03	22/03	730	150	8	0.05	249.66
RODDER ISLAND	12/05	14/05	30	20	2	0.00	0.12
S. END LOUISE NARROWS	14/04	14/04	50	20	8	0.00	2.40
S. END LOUISE NARROWS	14/04	15/04	160	15	6	0.00	3.36
S. END LOUISE NARROWS	14/04	14/04	230	10	7	0.00	4.37
S. END LOUISE NARROWS	14/04	15/04	170	15	7	0.00	4.84
S. END LOUISE NARROWS	14/04	15/04	100	50	6	0.05	6.65

Table 13 (contd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 2, EAST COAST Q.C.I. CONTINUED							
S. END LOUISE NARROWS	14/04	15/04	180	20	6	0.10	4.54
S. END LOUISE NARROWS	14/04	15/04	200	25	6	0.10	6.30
S. END LOUISE NARROWS	14/04	14/04	160	15	6	0.00	3.36
SAW REEF	30/03	30/03	400	15	7	0.10	10.26
SAW REEF	30/03	30/03	1300	10	7	0.60	9.88
SAW REEF	17/03	18/03	1800	40	9	0.40	129.60
SCUDDER POINT	17/03	18/03	1400	150	7	0.30	279.30
SECOND BEACH +	05/04	05/04	200	5	2	0.25	0.15
SECOND BEACH +	05/04	05/04	400	5	2	0.40	0.24
SEDGWICK BAY	05/04	07/04	400	10	5	0.40	2.40
SEDGWICK BAY	05/04	07/04	360	10	4	0.75	0.58
SEDGWICK BAY	17/04	17/04	60	10	4	0.00	0.39
SEDGWICK BAY	17/04	17/04	1100	8	4	0.20	4.58
SEDGWICK BAY	05/04	07/04	500	2	1	0.85	0.01
SEDGWICK BAY	05/04	07/04	200	10	5	0.50	1.00
SEDGWICK BAY	17/04	17/04	250	5	4	0.00	0.81
SELWYN INLET	13/04	14/04	2400	5	3	0.00	4.80
SELWYN INLET	28/05	28/05	120	6	5	0.10	0.65
SELWYN INLET	28/05	28/05	25	8	5	0.00	0.20
SELWYN INLET	13/04	14/04	600	4	4	0.15	1.33
SELWYN INLET	13/04	14/04	500	6	3	0.95	0.06
SWAN ISLANDS	29/03	01/04	700	20	3	0.50	2.80
TORRENS IS. (BARE IS.)	12/05	14/05	200	30	8	0.10	12.96
TORRENS IS. (BARE IS.)	12/05	14/05	175	10	5	0.00	1.75
TORRENS IS. (BARE IS.)	12/05	14/05	20	10	3	0.50	0.04
TORRENS IS. (BARE IS.)	12/05	14/05	20	10	4	0.50	0.06
TORRENS IS. (BARE IS.)	12/05	14/05	75	7	4	0.50	0.17
TRANSIT ISLAND	07/05	12/05	250	10	4	0.10	1.46
TRANSIT ISLAND	07/05	12/05	210	4	5	0.10	0.76
TRANSIT ISLAND	07/05	12/05	275	20	5	0.00	5.50
TRANSIT ISLAND	07/05	12/05	200	16	8	0.15	6.53
TRANSIT ISLAND	07/05	12/05	350	12	4	0.60	1.09
TRANSIT ISLAND	07/05	12/05	125	4	6	0.00	0.70
TRANSIT ISLAND	07/05	12/05	300	7	5	0.60	0.84
TRAYNOR CREEK	12/04	13/04	350	4	6	0.00	1.96
TRAYNOR CREEK	12/04	13/04	225	10	6	0.05	2.99
TRAYNOR CREEK	12/04	13/04	100	5	6	0.00	0.70
TRAYNOR CREEK	12/04	13/04	320	4	5	0.00	1.28
TRAYNOR CREEK	12/04	13/04	115	6	5	0.00	0.69
TRAYNOR CREEK	12/04	13/04	125	8	4	0.00	0.65
TRAYNOR CREEK	12/04	13/04	225	7	5	0.00	1.58
TRAYNOR CREEK	11/04	12/04	150	20	5	0.20	2.40
TRAYNOR CREEK	12/04	13/04	500	7	5	0.05	3.33
TRAYNOR CREEK	12/04	13/04	400	5	4	0.00	1.30

Table 13 (cont'd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 2, EAST COAST Q.C.I. CONTINUED							
TRAYNOR CREEK	11/04	12/04	500	7	4	0.15	1.93
TREE ISLAND (JEWELL IS.)	11/05	13/05	150	12	2	0.00	0.36
TREE ISLAND (JEWELL IS.)	11/05	13/05	100	10	3	0.25	0.30
AREA TOTAL			58510.				1669.66
AREA: 3, NASS							
FINLAYSON ISLAND EAST	25/04	02/05	1000	30	4	0.00	19.50
FINLAYSON ISLAND EAST	25/04	02/05	2000	10	2	0.00	4.00
FINLAYSON ISLAND EAST	25/04	02/05	850	30	4	0.00	16.58
FINLAYSON ISLAND EAST	25/04	02/05	650	25	2	0.00	3.25
STUHAUN BAY	22/03	24/03	100	10	1	0.00	0.05
STUHAUN BAY	22/03	24/03	300	50	1	0.00	0.75
STUHAUN BAY	22/03	24/03	100	12	4	0.30	0.55
STUHAUN BAY	22/03	24/03	30	10	5	0.00	0.30
STUHAUN BAY	22/03	24/03	300	30	1	0.00	0.45
STUHAUN BAY	22/03	24/03	800	50	4	0.00	26.00
STUHAUN BAY	22/03	24/03	500	15	5	0.20	6.00
AREA TOTAL			6630.				77.42
AREA: 4, SKEENA							
BARRETT ISLAND	12/04	15/04	100	50	3	0.50	1.00
BELLETTI POINT	28/03	01/04	350	35	5	0.15	10.41
BIG BAY	26/03	30/03	1500	50	3	0.25	22.50
BIG BAY	25/03	30/03	100	8	3	0.10	0.29
BIG BAY	28/03	01/04	1300	75	4	0.20	50.70
BIG BAY	26/03	30/03	650	500	3	0.50	65.00
BIG BAY	26/03	30/03	350	10	3	0.00	1.40
BIG BAY	26/03	30/03	1100	400	4	0.00	286.00
BIG BAY	25/03	30/03	1100	400	1	0.00	22.00
BIG BAY	28/03	01/04	50	20	3	0.10	0.36
BIG BAY	26/03	30/03	740	70	3	0.25	15.54
BIG BAY	25/03	30/03	250	40	3	0.00	4.00

Table 13 (cont'd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 4, SKEENA	CONTINUED						
BIG BAY	28/03	01/04	1500	125	4	0.25	91.41
BURNT CLIFF ISLAND	30/03	02/04	100	20	4	0.20	1.04
BURNT CLIFF ISLAND	30/03	03/04	400	60	3	0.30	6.72
BURNT CLIFF ISLAND	30/03	03/04	200	15	5	0.00	3.00
BURNT CLIFF ISLAND	30/03	03/04	500	15	6	0.00	10.50
BURNT CLIFF ISLAND	28/03	01/04	300	70	7	0.40	23.94
BURNT CLIFF ISLAND	28/03	01/04	600	200	5	0.00	120.00
BURNT CLIFF ISLAND	28/03	01/04	300	100	3	0.10	10.80
BURNT CLIFF ISLAND	28/03	01/04	300	125	3	0.10	13.50
BURNT CLIFF ISLAND	30/03	03/04	350	15	4	0.00	3.41
BURNT CLIFF ISLAND	28/03	01/04	300	10	3	0.00	1.20
CREAK ISLANDS	12/04	15/04	100	150	4	0.30	6.82
CREAK ISLANDS	11/04	14/04	75	5	5	0.60	0.15
CREAK ISLANDS	12/04	15/04	25	1	3	0.30	0.01
CREAK ISLANDS	12/04	15/04	100	15	6	0.50	1.05
CREAK ISLANDS	12/04	15/04	1500	150	3	0.60	36.00
CREAK ISLANDS	11/04	14/04	50	3	2	0.50	0.01
CREAK ISLANDS	12/04	15/04	100	25	6	0.50	1.75
CREAK ISLANDS	12/04	15/04	25	5	3	0.50	0.03
CREAK ISLANDS	12/04	14/04	75	25	5	0.60	0.75
CREAK ISLANDS	11/04	14/04	250	50	5	0.25	9.38
CREAK ISLANDS	12/04	15/04	200	10	4	0.10	1.17
CREAK ISLANDS	12/04	15/04	450	20	5	0.50	4.50
CREAK ISLANDS	11/04	14/04	150	10	3	0.25	0.45
CREAK ISLANDS	12/04	15/04	200	50	2	0.30	1.40
CREAK ISLANDS	11/04	14/04	700	25	3	0.30	4.90
CREAK POINT	10/04	14/04	50	50	5	0.15	2.13
CREAK POINT	10/04	14/04	300	10	5	0.20	2.40
CREAK POINT	10/04	14/04	30	10	3	0.15	0.10
CREAK POINT	10/04	14/04	30	5	3	0.00	0.06
CREAK POINT	10/04	14/04	25	5	3	0.00	0.05
CREAK POINT	11/04	14/04	25	5	4	0.20	0.06
CREAK POINT	10/04	14/04	100	75	6	0.10	9.45
CREAK POINT	10/04	14/04	15	7	4	0.00	0.07
CREAK POINT	10/04	14/04	30	20	3	0.10	0.22
CREAK POINT	10/04	14/04	100	20	6	0.20	2.24
FINLAYSON ISLAND WEST	30/03	03/04	75	10	3	0.50	0.15
FINLAYSON ISLAND WEST	30/03	03/04	100	25	5	0.15	2.13
FINLAYSON ISLAND WEST	30/03	03/04	75	4	5	0.20	0.24
FINLAYSON ISLAND WEST	30/03	03/04	75	10	4	0.00	0.49
FINLAYSON ISLAND WEST	30/03	03/04	100	15	3	0.10	0.54
FINLAYSON ISLAND WEST	30/03	03/04	150	15	3	0.10	0.81
HUNT POINT	09/04	14/04	100	100	6	0.03	13.38
HUNT POINT	09/04	14/04	50	50	3	0.10	0.90
HUNT POINT	09/04	14/04	800	15	5	0.60	4.80

Table 13 (contrd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 4, SKEENA	CONTINUED						
HUNT POINT	09/04	14/04	500	15	5	0.50	3.75
HUNTS INLET	09/04	13/04	600	10	6	0.50	4.20
HUNTS INLET	10/04	14/04	300	20	5	0.10	5.40
HUNTS INLET	10/04	14/04	300	10	6	0.05	3.99
HUNTS INLET	07/04	13/04	150	60	8	0.10	19.44
HUNTS INLET	07/04	13/04	60	7	7	0.00	0.80
HUNTS INLET	10/04	14/04	100	10	2	0.50	0.10
HUNTS INLET	10/04	14/04	400	50	6	0.20	22.40
HUNTS INLET	09/04	13/04	700	20	4	0.15	7.74
HUNTS INLET	11/04	13/04	400	8	6	0.50	2.24
HUNTS INLET	07/04	13/04	100	4	3	0.25	0.12
HUNTS INLET	08/04	13/04	250	10	6	0.20	2.80
HUNTS INLET	07/04	13/04	100	50	7	0.00	9.50
HUNTS INLET	11/04	13/04	300	5	6	0.50	1.05
HUNTS INLET	10/04	13/04	200	20	6	0.10	5.04
HUNTS INLET	07/04	13/04	400	30	7	0.15	19.38
HUNTS INLET	10/04	14/04	300	15	4	0.05	2.78
HUNTS INLET	11/04	13/04	100	10	3	0.75	0.10
HUNTS INLET	07/04	13/04	50	30	7	0.10	2.56
HUNTS INLET	11/04	13/04	300	10	4	0.50	0.97
HUNTS INLET	07/04	13/04	75	1	4	0.70	0.01
HUNTS INLET	08/04	13/04	250	10	4	0.10	1.46
ISLAND POINT	08/04	14/04	50	50	9	0.00	7.50
ISLAND POINT	08/04	14/04	125	10	7	0.00	2.38
ISLAND POINT	07/04	13/04	75	30	8	0.50	2.70
ISLAND POINT	08/04	14/04	250	10	5	0.00	2.50
ISLAND POINT	09/04	14/04	300	20	5	0.05	5.70
ISLAND POINT	08/04	14/04	550	20	8	0.20	21.12
ISLAND POINT	08/04	13/04	225	15	8	0.60	3.24
ISLAND POINT	08/04	14/04	550	5	9	0.50	4.13
ISLAND POINT	07/04	13/04	700	12	3	0.15	2.86
ISLAND POINT	11/04	14/04	180	6	6	0.10	1.36
ISLAND POINT	08/04	14/04	75	5	3	0.00	0.15
ISLAND POINT	09/04	14/04	180	20	7	0.25	5.13
ISLAND POINT	08/04	14/04	20	12	8	0.00	0.58
ISLAND POINT	11/04	14/04	40	5	6	0.10	0.25
ISLAND POINT	09/04	14/04	460	25	6	0.15	13.69
ISLAND POINT	11/04	14/04	40	10	8	0.15	0.82
ISLAND POINT	08/04	13/04	120	5	3	0.00	0.24
ISLAND POINT	07/04	13/04	100	50	7	0.00	9.50
MCMICKING ISLAND	28/04	28/04	75	2	4	0.05	0.09
MCMICKING ISLAND	17/05	17/05	50	20	3	0.00	0.40
MCMICKING ISLAND	17/05	17/05	50	50	3	0.00	1.00
MCMICKING ISLAND	28/04	28/04	100	5	4	0.25	0.24
MCMICKING ISLAND	20/04	22/04	450	2	4	0.00	0.58

Table 13 (cont'd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 4, SKEENA	CONTINUED						
PEARL HARBOUR	30/03	02/04	150	100	6	0.05	19.95
PEARL HARBOUR	29/03	02/04	75	10	2	0.50	0.08
PEARL HARBOUR	30/03	02/04	925	200	5	0.00	185.00
PEARL HARBOUR	29/03	02/04	120	120	6	0.00	20.16
PEARL HARBOUR	30/03	02/04	460	30	2	0.00	2.76
PEARL HARBOUR	30/03	02/04	75	200	4	0.00	9.75
PEARL HARBOUR	30/03	02/04	300	20	4	0.20	3.12
PEARL HARBOUR	30/03	02/04	30	15	5	0.00	0.45
RYAN POINT	30/03	03/04	480	15	4	0.60	1.87
RYAN POINT	30/03	03/04	1000	50	4	0.50	16.25
SLIPPERY ROCK	29/03	07/04	125	50	2	0.60	0.50
SLIPPERY ROCK	29/03	07/04	575	50	4	0.20	14.95
SLIPPERY ROCK	29/03	03/04	740	150	2	0.00	22.20
SLIPPERY ROCK	29/03	07/04	200	50	2	0.30	1.40
SWAMP ISLAND	30/03	03/04	425	25	5	0.00	10.63
SWAMP ISLAND	30/03	03/04	100	75	5	0.30	5.25
SWAMP ISLAND	30/03	03/04	1100	400	5	0.80	88.00
TREE BLUFF	29/03	07/04	100	100	4	0.80	1.30
TREE BLUFF	28/03	03/04	450	300	3	0.00	54.00
TREE BLUFF	29/03	03/03	100	10	2	0.60	0.08
TREE BLUFF	29/03	07/04	500	25	6	0.20	14.00
TREE BLUFF	28/03	03/04	400	50	5	0.10	18.00
TREE BLUFF	28/03	03/04	1600	75	4	0.50	39.00
AREA TOTAL			39400.				1604.17
AREA: 5, GRENVILLE-PRINCIPE							
CRAZY INLET +	03/05	03/05	150	10	4	0.50	0.49
CRAZY INLET +	03/05	03/05	200	10	6	0.50	1.40
FREEMAN PASSAGE	12/04	15/04	200	10	4	0.25	0.97
FREEMAN PASSAGE	09/04	11/04	300	40	6	0.30	11.76
FREEMAN PASSAGE	09/04	11/04	300	15	6	0.20	5.04
FREEMAN PASSAGE	11/04	13/04	150	100	3	0.40	3.60
FREEMAN PASSAGE	12/04	15/04	75	25	4	0.10	1.10
FREEMAN PASSAGE	11/04	13/04	75	10	2	0.30	0.11
FREEMAN PASSAGE	11/04	13/04	75	20	7	0.10	2.56
FREEMAN PASSAGE	11/04	13/04	300	100	3	0.30	8.40
FREEMAN PASSAGE	11/04	13/04	70	20	5	0.20	1.12
FREEMAN PASSAGE	09/04	11/04	250	50	7	0.50	11.88

Table 13 (cont'd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 5, GRENVILLE-PRINCIPE CONTINUED							
FREEMAN PASSAGE	12/04	15/04	100	25	4	0.50	0.81
FREEMAN PASSAGE	12/04	15/04	100	10	4	0.50	0.32
FREEMAN PASSAGE	11/04	13/04	200	75	5	0.75	3.75
FREEMAN PASSAGE	12/04	15/04	320	10	2	0.30	0.45
FREEMAN PASSAGE	11/04	13/04	150	50	7	0.20	11.40
FREEMAN PASSAGE	11/04	13/04	100	25	5	0.10	2.25
FREEMAN PASSAGE	09/04	11/04	175	20	6	0.40	2.94
GOSCHEN ISLAND	15/04	18/04	25	10	7	0.10	0.43
GOSCHEN ISLAND	15/04	18/04	1800	25	5	0.25	33.75
GOSCHEN ISLAND	15/04	18/04	40	10	8	0.00	0.96
GOSCHEN ISLAND	15/04	18/04	1200	7	3	0.60	1.34
GOSCHEN ISLAND	15/04	18/04	30	10	8	0.10	0.65
GOSCHEN ISLAND	15/04	18/04	1000	7	4	0.50	2.28
GOSCHEN ISLAND	15/04	18/04	1000	5	3	0.35	1.30
KITKATLA CREEK	06/03	07/03	300	10	3	0.25	0.90
KITKATLA CREEK	06/03	07/03	250	75	5	0.50	9.38
TANGENT ISLAND	03/05	03/05	350	10	8	0.15	7.14
TANGENT ISLAND	03/05	03/05	475	10	9	0.15	12.11
TANGENT ISLAND	03/05	03/05	450	10	5	0.25	3.38
TANGENT ISLAND	03/05	03/05	150	100	9	0.00	45.00
TANGENT ISLAND	03/05	03/05	50	10	7	0.40	0.57
TANGENT ISLAND	03/05	03/05	150	10	6	0.40	1.26
TANGENT ISLAND	03/05	03/05	250	100	9	0.00	75.00
WILCOX GROUP	06/03	11/03	400	20	4	0.50	2.60
WILCOX GROUP	06/03	11/03	200	150	3	0.30	8.40
WILCOX GROUP	06/03	11/03	100	5	5	0.20	0.40
WILCOX GROUP	06/03	11/03	200	10	4	0.20	1.04
WILCOX GROUP	06/03	11/03	100	50	4	0.25	2.44
WILCOX GROUP	06/03	11/03	400	5	4	0.10	1.17
WILCOX GROUP	06/03	11/03	300	25	4	0.50	2.44
WILCOX GROUP	06/03	11/03	700	75	5	0.50	26.25
WILCOX GROUP	06/03	11/03	300	5	5	0.10	1.35
WILCOX GROUP	06/03	11/03	100	50	6	0.30	4.90
WILCOX GROUP	06/03	11/03	100	50	3	0.50	1.00
WILCOX GROUP	06/03	11/03	200	5	4	0.25	0.49
WILCOX GROUP	06/03	11/03	200	50	3	0.70	1.20
WILCOX GROUP	06/03	11/03	100	75	5	0.10	6.75
WILLIS BAY	11/04	13/04	900	10	4	0.40	3.51
WILLIS BAY	11/04	13/04	50	10	3	0.50	0.10
WILLIS BAY	15/04	18/04	540	25	4	0.20	7.02
WILLIS BAY	15/04	18/04	500	25	4	0.10	7.31
WILLIS BAY	15/04	18/04	500	10	3	0.10	1.80
WILLIS BAY	15/04	18/04	540	75	7	0.00	76.95
WILLIS BAY	11/04	13/04	150	75	6	0.60	6.30
AREA TOTAL			17390.				429.20

Table 13 (cont'd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 6, BUTEDALE							
MARVIN ISLANDS	28/03	31/03	200	10	5	0.30	1.40
MARVIN ISLANDS	28/03	31/03	425	15	6	0.30	6.25
PARSONS ANCHORAGE	28/03	31/03	550	15	6	0.30	8.09
PARSONS ANCHORAGE	28/03	31/03	350	25	8	0.10	18.90
PARSONS ANCHORAGE	28/03	31/03	500	10	5	0.50	2.50
PARSONS ANCHORAGE	21/03	21/03	200	10	2	0.25	0.30
PARSONS ANCHORAGE	30/03	31/03	325	12	4	0.40	1.52
PARSONS ANCHORAGE	28/03	31/03	675	8	6	0.30	5.29
PARSONS ANCHORAGE	28/03	31/03	1275	12	8	0.20	29.38
PARSONS ANCHORAGE	30/03	31/03	325	12	3	0.50	0.78
PARSONS ANCHORAGE	28/03	31/03	575	25	8	0.10	31.05
PARSONS ANCHORAGE	21/03	21/03	200	25	3	0.30	1.40
PARSONS ANCHORAGE	28/03	31/03	625	75	7	0.50	44.53
PARSONS ANCHORAGE	28/03	31/03	325	12	5	0.50	1.95
WEETEEAM BAY	09/03	11/03	1150	15	4	0.20	8.97
WEETEEAM BAY	09/03	11/03	250	3	4	0.30	0.34
WEETEEAM BAY	09/03	11/03	250	40	7	0.30	13.30
WEETEEAM BAY	09/03	11/03	225	35	6	0.50	5.51
WEETEEAM BAY	09/03	11/03	550	42	7	0.40	26.33
WEETEEAM BAY	09/03	11/03	1450	10	6	0.10	18.27
WEETEEAM BAY	13/03	14/03	125	5	6	0.10	0.79
WEETEEAM BAY	09/03	11/03	250	5	6	0.20	1.40
WEETEEAM BAY	13/03	14/03	2550	15	6	0.20	42.84
WEETEEAM BAY	09/03	11/03	175	5	6	0.20	0.98
WEETEEAM BAY	13/03	14/03	250	40	8	0.40	14.40
WEETEEAM BAY	09/03	11/03	525	10	7	0.20	7.98
WEETEEAM BAY	09/03	11/03	475	12	7	0.10	9.75
WEETEEAM BAY	13/03	14/03	350	33	5	0.20	9.24
WEETEEAM BAY	09/03	11/03	1100	10	3	0.30	3.08
WEETEEAM BAY	09/03	11/03	250	7	5	0.25	1.31
WILBY POINT	31/03	01/04	300	20	6	0.25	6.30
WILBY POINT	28/03	31/03	1200	20	5	0.40	14.40
WILBY POINT	28/03	31/03	850	8	5	0.40	4.08
WILBY POINT	28/03	31/03	1100	10	5	0.30	7.70
WILBY POINT	31/03	01/04	1200	25	6	0.10	37.80
WILBY POINT	31/03	01/04	200	10	5	0.30	1.40
WILBY POINT	28/03	31/03	800	10	5	0.10	7.20
AREA TOTAL			22125.				396.71

Table 13 (contd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 7, BELLA BELLA							
BEND PT.	04/04	05/04	500	3	2	0.10	0.27
BEND PT.	15/03	17/03	750	15	4	0.10	6.58
CECILIA ISLAND	07/04	10/04	50	40	3	0.45	0.44
CECILIA ISLAND	07/04	10/04	35	20	7	0.50	0.67
CECILIA ISLAND	14/03	16/03	450	5	3	0.10	0.81
CECILIA ISLAND	14/03	16/03	1025	5	2	0.20	0.82
CECILIA ISLAND	07/04	10/04	90	3	3	0.20	0.09
CECILIA ISLAND	07/04	10/04	200	3	3	0.75	0.06
CECILIA ISLAND	14/03	16/03	540	10	3	0.10	1.94
CECILIA ISLAND	07/04	10/04	30	6	3	0.30	0.05
CECILIA ISLAND	07/04	10/04	180	3	3	0.30	0.15
CULTUS SOUND	03/04	04/04	137	18	2	0.60	0.20
CULTUS SOUND	03/04	04/04	229	4	3	0.50	0.18
DUNDIVAN INLET	02/04	04/04	229	4	7	0.25	1.31
DUNDIVAN INLET	02/04	04/04	137	3	4	0.40	0.16
DUNDIVAN INLET	02/04	04/04	119	4	4	0.40	0.19
DUNDIVAN INLET	02/04	04/04	549	5	8	0.00	6.59
DUNDIVAN INLET	02/04	04/04	137	4	8	0.35	0.85
DUNDIVAN INLET	02/04	04/04	411	3	5	0.30	0.86
EAST HIGGINS PASS	31/03	02/04	600	15	6	0.20	10.08
EAST HIGGINS PASS	31/03	02/04	1275	10	6	0.15	15.17
EAST HIGGINS PASS	31/03	02/04	300	5	6	0.20	1.68
EAST HIGGINS PASS	31/03	02/04	200	8	4	0.30	0.73
EAST HIGGINS PASS	31/03	02/04	250	20	5	0.60	2.00
EAST HIGGINS PASS	31/03	02/04	1200	10	5	0.20	9.60
EAST HIGGINS PASS	31/03	02/04	1000	15	7	0.15	24.23
EAST HIGGINS PASS	31/03	02/04	1200	25	6	0.10	37.80
HOUGHTON ISLANDS	30/03	31/03	80	30	7	0.30	3.19
HOUGHTON ISLANDS	30/03	31/03	200	15	6	0.30	2.94
HOUGHTON ISLANDS	30/03	31/03	275	20	6	0.40	4.62
HOUGHTON ISLANDS	30/03	31/03	300	80	8	0.60	23.04
IVORY ISLAND	20/03	23/03	110	3	3	0.30	0.09
IVORY ISLAND	20/03	23/03	120	65	4	0.30	3.53
IVORY ISLAND	20/03	23/03	90	9	2	0.50	0.08
IVORY ISLAND	20/03	23/03	300	3	3	0.40	0.22
IVORY ISLAND	20/03	23/03	120	3	4	0.10	0.21
LADY TRUTCH PASS	31/03	03/04	100	100	7	0.35	12.35
LADY TRUTCH PASS	31/03	03/04	350	50	5	0.30	12.25
LADY TRUTCH PASS	31/03	03/04	100	100	6	0.40	8.40
LADY TRUTCH PASS	31/03	03/04	2500	5	5	0.25	9.38

Table 13 (cont'd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 7, BELLA BELLA CONTINUED							
LITTLE THOMPSON BAY	02/04	04/04	700	12	4	0.10	4.91
LITTLE THOMPSON BAY	31/03	03/04	1200	8	3	0.40	2.30
LITTLE THOMPSON BAY	01/04	01/04	1100	30	3	0.20	10.56
LITTLE THOMPSON BAY	27/03	30/03	300	40	6	0.50	8.40
LITTLE THOMPSON BAY	01/04	01/04	160	20	4	0.60	0.83
LITTLE THOMPSON BAY	21/03	21/03	50	2	3	0.30	0.03
MCNAUGHTON GROUP	10/04	12/04	70	50	3	0.30	0.98
MCNAUGHTON GROUP	31/03	01/04	549	2	5	0.50	0.55
MCNAUGHTON GROUP	31/03	01/04	549	3	3	0.75	0.16
MCNAUGHTON GROUP	10/04	12/04	300	6	4	0.20	0.94
NORMAN MORRISON BAY	03/04	05/04	280	5	3	0.30	0.39
NORMAN MORRISON BAY	03/04	05/04	750	15	6	0.10	14.17
NORMAN MORRISON BAY	03/04	05/04	190	7	3	0.20	0.43
NORMAN MORRISON BAY	03/04	05/04	785	5	6	0.10	4.95
NORMAN MORRISON BAY	03/04	05/04	560	10	2	0.40	0.67
NORMAN MORRISON BAY	03/04	05/04	280	5	4	0.20	0.73
NORMAN MORRISON BAY	03/04	05/04	185	10	3	0.30	0.52
NORMAN MORRISON BAY	03/04	05/04	185	5	2	0.50	0.09
POWELL ANCHORAGE	01/04	03/04	9	2	6	0.10	0.02
POWELL ANCHORAGE	01/04	03/04	182	3	3	0.25	0.16
POWELL ANCHORAGE	01/04	03/04	6	3	3	0.15	0.01
POWELL ANCHORAGE	01/04	03/04	15	2	4	0.10	0.02
POWELL ANCHORAGE	01/04	03/04	30	2	4	0.15	0.03
POWELL ANCHORAGE	01/04	03/04	12	3	3	0.25	0.01
POWELL ANCHORAGE	01/04	03/04	27	9	4	0.10	0.14
POWELL ANCHORAGE	01/04	03/04	360	3	5	0.20	0.86
POWELL ANCHORAGE	01/04	03/04	730	3	6	0.35	1.99
POWELL ANCHORAGE	01/04	03/04	210	2	2	0.25	0.06
POWELL ANCHORAGE	01/04	03/04	180	12	5	0.40	1.30
POWELL ANCHORAGE	01/04	03/04	180	5	5	0.15	0.76
POWELL ANCHORAGE	01/04	03/04	27	3	5	0.30	0.06
POWELL ANCHORAGE	01/04	03/04	120	3	5	0.25	0.27
POWELL ANCHORAGE	01/04	03/04	300	2	3	0.50	0.12
POWELL ANCHORAGE	01/04	03/04	51	5	5	0.40	0.15
POWELL ANCHORAGE	01/04	03/04	21	3	3	0.10	0.02
POWELL ANCHORAGE	01/04	03/04	15	2	3	0.20	0.01
POWELL ANCHORAGE	01/04	03/04	30	15	6	0.20	0.50
POWELL ANCHORAGE	01/04	03/04	19	2	2	0.35	0.00
POWELL ANCHORAGE	01/04	03/04	185	6	3	0.45	0.24
PRINCESS ALICE ISLAND	30/03	31/03	110	40	2	0.20	0.70
PRINCESS ALICE ISLAND	09/03	19/03	732	46	4	0.50	10.94
REID PASSAGE	26/03	27/03	65	15	6	0.15	1.16
SPIDER ISLAND	14/04	14/04	90	5	2	0.80	0.02
SPIDER ISLAND	14/04	17/04	100	20	3	0.70	0.24
SPILLER CHANNEL	13/03	16/03	640	2	5	0.15	1.09

Table 13 (cont'd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 7, BELLA BELLA	CONTINUED						
SPILLER CHANNEL	13/03	16/03	2037	3	6	0.20	6.84
SPILLER CHANNEL	13/03	16/03	741	3	5	0.45	1.22
SPILLER CHANNEL	13/03	16/03	370	3	3	0.40	0.27
SPILLER CHANNEL	13/03	16/03	1111	3	3	0.70	0.40
SPILLER CHANNEL	13/03	16/03	370	3	6	0.20	1.24
SPILLER CHANNEL	13/03	16/03	555	3	6	0.50	1.17
SPILLER CHANNEL	13/03	16/03	91	6	9	0.15	1.39
SPILLER CHANNEL	13/03	16/03	1111	2	6	0.40	1.87
SPILLER CHANNEL	13/03	16/03	1646	3	5	0.30	3.46
SPILLER CHANNEL	13/03	16/03	185	3	3	0.75	0.06
SPILLER CHANNEL	13/03	16/03	555	4	9	0.20	5.33
SPILLER CHANNEL	13/03	16/03	926	4	9	0.00	11.11
SPILLER CHANNEL	13/03	16/03	1280	3	5	0.45	2.11
SPILLER CHANNEL	13/03	16/03	91	4	8	0.10	0.79
SPILLER CHANNEL	13/03	16/03	555	3	4	0.70	0.32
SPILLER CHANNEL	13/03	16/03	46	4	8	0.00	0.44
SPILLER CHANNEL	13/03	16/03	1481	2	5	0.40	1.78
SPILLER CHANNEL	13/03	16/03	549	2	5	0.40	0.66
STRYKER BAY	01/04	03/04	700	40	3	0.30	7.84
STRYKER BAY	03/04	03/04	150	8	6	0.10	1.51
STRYKER BAY	31/03	01/04	375	10	5	0.15	3.19
STRYKER BAY	01/04	03/04	200	10	6	0.10	2.52
STRYKER BAY	31/03	03/04	1150	4	3	0.15	1.56
STRYKER BAY	26/03	02/04	675	12	5	0.10	7.29
STRYKER BAY	29/03	01/04	125	60	8	0.15	15.30
STRYKER BAY	31/03	01/04	900	30	5	0.20	21.60
STRYKER BAY	02/04	03/04	250	12	4	0.15	1.66
STRYKER BAY	02/04	03/04	800	60	4	0.20	24.96
WATCH ISLAND	24/03	30/03	15	10	2	0.50	0.01
WATCH ISLAND	24/03	30/03	500	6	3	0.15	1.02
WATCH ISLAND	18/03	21/03	120	5	3	0.10	0.22
WATCH ISLAND	24/03	30/03	600	10	3	0.15	2.04
WATCH ISLAND	24/03	30/03	300	200	3	0.15	20.40
WATCH ISLAND	18/03	21/03	60	5	4	0.10	0.18
WATCH ISLAND	24/03	30/03	20	20	3	0.10	0.14
WATCH ISLAND	24/03	30/03	20	20	3	0.05	0.15
WATCH ISLAND	18/03	21/03	792	9	5	0.25	5.35
WATCH ISLAND	24/03	30/03	100	20	2	0.75	0.10
WATCH ISLAND	18/03	21/03	15	3	3	0.15	0.02
WATCH ISLAND	18/03	21/03	150	60	5	0.60	3.60
WATCH ISLAND	20/03	22/03	243	5	3	0.00	0.49
WATCH ISLAND	24/03	30/03	80	20	3	0.65	0.22
WATCH ISLAND	20/03	22/03	458	5	3	0.30	0.64
WATCH ISLAND	20/03	22/03	91	15	5	0.25	1.02

Table 13 (cont'd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 7, BELLA BELLA	CONTINUED						
WATCH ISLAND	20/03	22/03	118	30	3	0.10	1.27
WATCH ISLAND	18/03	21/03	121	60	5	0.05	6.90
AREA TOTAL			51935.				448.00
AREA: 8, BELLA COOLA							
BURKE CHANNEL	23/05	30/05	1200	10	6	0.10	15.12
BURKE CHANNEL	23/05	30/05	3600	3	7	0.10	18.47
BURKE CHANNEL	23/05	30/05	1600	3	6	0.00	6.72
BURKE CHANNEL	23/05	01/06	4400	3	8	0.10	28.51
BURKE CHANNEL	23/05	30/05	1200	3	7	0.10	6.16
BURKE CHANNEL	23/05	30/05	1600	2	8	0.15	6.53
BURKE CHANNEL	23/05	30/05	4000	1	6	0.20	4.48
ILLAHIE INLET	20/03	23/03	2000	5	8	0.05	22.80
ILLAHIE INLET	20/03	23/03	150	5	6	0.35	0.68
ILLAHIE INLET	20/03	23/03	150	15	6	0.35	2.05
ILLAHIE INLET	20/03	23/03	300	4	5	0.30	0.84
ILLAHIE INLET	30/03	31/03	50	25	9	0.40	2.25
ILLAHIE INLET	20/03	23/03	450	4	5	0.30	1.26
ILLAHIE INLET	30/03	31/03	800	4	5	0.35	2.08
ILLAHIE INLET	20/03	23/03	250	5	8	0.15	2.55
ILLAHIE INLET	20/03	23/03	250	8	7	0.10	3.42
ILLAHIE INLET	20/03	28/03	450	4	5	0.40	1.08
ILLAHIE INLET	30/03	31/03	40	50	9	0.35	3.90
KEITH ANCHORAGE	19/03	25/03	160	20	5	0.40	1.92
KEITH ANCHORAGE	19/03	25/03	60	20	5	0.35	0.78
KEITH ANCHORAGE	19/03	25/03	360	15	3	0.50	1.08
KEITH ANCHORAGE	19/03	25/03	150	30	4	0.45	1.61
KEITH ANCHORAGE	19/03	25/03	400	2	3	0.30	0.22
KEITH ANCHORAGE	19/03	25/03	180	10	3	0.60	0.29
KEITH ANCHORAGE	19/03	25/03	160	15	3	0.65	0.34
KEITH ANCHORAGE	19/03	25/03	400	80	5	0.40	19.20
KWAKSHUA CHANNEL	19/03	25/03	35	45	4	0.20	0.82
KWAKSHUA CHANNEL	19/03	25/03	100	3	5	0.60	0.12
KWAKSHUA CHANNEL	19/03	25/03	300	4	5	0.30	0.84
KWAKSHUA CHANNEL	19/03	25/03	350	2	4	0.50	0.23
KWAKUME POINT	28/03	29/03	310	4	7	0.50	1.18
KWAKUME POINT	28/03	29/03	30	10	9	0.70	0.27
KWAKUME POINT	28/03	29/03	50	5	2	0.50	0.03
KWAKUME POINT	28/03	29/03	15	2	6	0.30	0.03

Table 13 (contd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 8, BELLA COOLA	CONTINUED						
KWAKUME POINT	28/03	29/03	200	4	8	0.50	0.96
NORTH BENTINCK ARM	03/03	07/03	3200	2	1	0.50	0.16
NORTH BENTINCK ARM	03/03	07/03	800	3	4	0.20	1.25
NORTH BENTINCK ARM	03/03	07/03	300	2	2	0.20	0.10
NORTH BENTINCK ARM	03/03	07/03	2000	2	2	0.30	0.56
NORTH BENTINCK ARM	03/03	07/03	2800	1	1	0.75	0.04
PRUTH BAY	19/03	25/03	100	10	4	0.35	0.42
PRUTH BAY	19/03	25/03	80	15	4	0.40	0.47
PRUTH BAY	19/03	25/03	500	2	3	0.30	0.28
PRUTH BAY	19/03	25/03	600	3	5	0.30	1.26
PRUTH BAY	19/03	25/03	650	2	3	0.30	0.36
PRUTH BAY	19/03	25/03	550	3	3	0.25	0.50
PRUTH BAY	19/03	25/03	400	80	4	0.50	10.40
AREA TOTAL			37730.				174.59
AREA: 9, RIVERS INLET							
KILBELLA BAY	14/03	14/03	3400	2	2	0.25	1.02
RIVERS INLET-HEAD	14/03	14/03	3500	2	2	0.25	1.05
RIVERS INLET-HEAD	14/03	14/03	3300	2	2	0.40	0.79
RIVERS INLET-HEAD	14/03	14/03	2000	2	2	0.40	0.48
AREA TOTAL			12200.				3.34
AREA: 10, SMITH INLET							
BURNT ISLAND	12/04	15/04	800	4	2	0.90	0.06
GREAVES ISLAND	16/04	20/04	300	12	3	0.15	1.22
INDIAN ISLAND	31/03	01/04	250	75	8	0.25	33.75
LEROY BAY	30/03	31/03	200	15	4	0.30	1.36
MCBRIDE BAY	16/04	20/04	500	8	3	0.15	1.36
TAKUSH HARBOUR	14/04	18/04	100	5	4	0.05	0.31
TAKUSH HARBOUR	30/03	31/03	450	5	3	0.30	0.63
TAKUSH HARBOUR	30/03	31/03	1200	75	5	0.20	72.00

Table 13 (contd). · HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 10, SMITH INLET	**CONTINUED**						
TAKUSH HARBOUR	29/03	31/03	1400	50	4	0.25	34.13
TAKUSH HARBOUR	29/03	30/03	20	10	4	0.30	0.09
AREA TOTAL			5220.				144.92
AREA: 11, SEYMOUR-BELIZE							
SEYMOUR INLET	12/04	16/04	600	1	3	0.30	0.17
SEYMOUR INLET	12/04	16/04	45	1	2	0.25	0.01
SEYMOUR INLET	12/04	16/04	180	1	3	0.10	0.06
SEYMOUR INLET	12/04	16/04	90	1	2	0.30	0.01
SEYMOUR INLET	12/04	16/04	30	1	2	0.00	0.01
SEYMOUR INLET	12/04	16/04	700	1	2	0.30	0.10
SEYMOUR INLET	12/04	16/04	90	1	2	0.25	0.01
SEYMOUR INLET	12/04	16/04	140	1	2	0.10	0.03
SEYMOUR INLET	12/04	16/04	45	1	2	0.25	0.01
SEYMOUR INLET	12/04	16/04	2400	1	2	0.00	0.48
AREA TOTAL			4320.				0.88
AREA: 12, ALERT BAY							
FORT RUPERT (BEAVER HR.)	24/03	27/03	1400	20	3	0.30	7.84
FORT RUPERT (BEAVER HR.)	24/03	27/03	1200	10	2	0.50	1.20
FORT RUPERT (BEAVER HR.)	24/03	27/03	100	10	4	0.60	0.26
FORT RUPERT (BEAVER HR.)	24/03	27/03	450	10	2	0.60	0.36
FORT RUPERT (BEAVER HR.)	24/03	27/03	1000	25	4	0.40	9.75
HARDY BAY	17/03	18/03	100	10	2	0.75	0.05
HARDY BAY	17/03	18/03	100	2	2	0.75	0.01
KENNETH PASSAGE	10/04	11/04	320	9	4	0.05	1.78
KENNETH PASSAGE	10/04	11/04	183	46	4	0.20	4.38
KENNETH PASSAGE	10/04	11/04	457	183	4	0.40	32.62
KENNETH PASSAGE	10/04	11/04	1829	18	4	0.20	17.12
KINGCOME INLET	18/03	20/03	550	3	2	0.50	0.17
KINGCOME INLET	03/04	07/04	914	4	4	0.20	1.90

Table 13 (cont'd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 12, ALERT BAY	**CONTINUED**						
KINGCOME INLET	03/04	07/04	914	5	4	0.15	2.52
KNIGHT INLET	14/03	15/03	229	5	3	0.10	0.41
KNIGHT INLET	14/03	15/03	91	7	3	0.10	0.23
KNIGHT INLET	20/03	22/03	823	7	4	0.10	3.37
KNIGHT INLET	20/03	22/03	640	2	4	0.10	0.75
KNIGHT INLET	10/03	12/03	6858	5	5	0.20	27.43
KNIGHT INLET	21/03	23/03	914	8	4	0.10	4.28
KNIGHT INLET	20/03	22/03	549	2	4	0.10	0.64
KNIGHT INLET	09/03	10/03	4572	18	4	0.10	48.14
KNIGHT INLET	21/03	23/03	1097	7	4	0.10	4.49
KNIGHT INLET	10/03	12/03	1829	7	5	0.20	10.24
WAKEMAN SOUND	09/03	15/03	5852	2	5	0.30	8.19
WAKEMAN SOUND	09/03	10/03	6384	5	4	0.10	18.67
AREA TOTAL			39355.				206.81
AREA: 13, QUATHIASKI							
DEEPWATER BAY	16/04	16/04	100	100	4	0.15	5.53
DEEPWATER BAY	16/04	16/04	160	5	3	0.30	0.22
DEEPWATER BAY	16/04	16/04	100	2	2	0.30	0.03
AREA TOTAL			360.				5.78
AREA: 14, COMOX							
BOWSER	12/03	12/03	1750	250	3	0.40	105.00
COMOX BAR	12/03	19/03	1006	91	7	0.30	86.97
COMOX BAR	18/03	19/03	1097	366	4	0.05	247.93
DEEP BAY	19/03	19/03	400	150	2	0.40	7.20
ENGLISHMAN RIVER	21/03	21/03	2000	100	3	0.40	48.00
ENGLISHMAN RIVER	27/03	27/03	700	100	3	0.40	16.80
FILLONGLEY PARK	11/03	14/03	2743	27	4	0.20	38.31
LITTLE QUALICUM RIVER	03/03	03/03	2000	100	2	0.20	32.00
NORMAN POINT	08/03	09/03	2954	12	3	0.90	1.42

Table 13 (cont'd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	DATE SPAWNED END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 14, COMOX	**CONTINUED**						
SHINGLE SPIT	12/03	15/03	1829	27	4	0.25	24.07
TRIBUNE BAY	08/03	09/03	9073	9	3	0.75	8.17
AREA TOTAL			25352.				616.07
AREA: 15, WESTVIEW							
HARWOOD ISLAND	08/03	08/03	2375	11	5	0.30	18.29
SAVARY ISLAND	12/03	12/03	2000	500	3	0.00	400.00
SAVARY ISLAND	12/03	12/03	1000	400	5	0.20	320.00
AREA TOTAL			5375.				738.29
AREA: 17, NANAIMO							
BOAT HARBOUR	16/04	16/04	500	7	5	0.15	2.98
BOAT HARBOUR	14/04	14/04	1000	6	4	0.20	3.12
COFFIN POINT (IS.)	20/03	20/03	850	70	7	0.45	62.18
COFFIN POINT (IS.)	16/03	16/03	1400	125	8	0.75	105.00
COFFIN POINT (IS.)	20/03	20/03	1400	85	9	0.05	339.15
COFFIN POINT (IS.)	20/03	20/03	950	25	5	0.10	21.38
COFFIN POINT (IS.)	16/03	16/03	2000	12	5	0.80	4.80
COFFIN POINT (IS.)	20/03	20/03	350	50	6	0.40	14.70
DEGNEN BAY	25/04	25/04	250	10	3	0.15	0.85
KULLEET BAY	16/03	16/03	1950	25	7	0.10	83.36
KULLEET BAY	16/03	16/03	1600	10	5	0.70	4.80
NANOOSE BAY	20/03	20/03	1000	5	1	0.90	0.03
SHARP POINT	22/03	22/03	600	5	8	0.05	6.84
SHARP POINT	22/03	22/03	750	6	7	0.15	7.27
YELLOW POINT	16/03	16/03	1150	90	6	0.40	86.94
YELLOW POINT	22/03	22/03	1250	75	6	0.25	98.44
YELLOW POINT	22/03	22/03	1800	10	5	0.75	4.50
YELLOW POINT	16/03	16/03	2200	30	7	0.10	112.86
AREA TOTAL			21000.				959.18

Table 13 (cont'd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 23, BARKLEY SOUND							
FORBES ISLAND	15/03	16/03	1325	115	5	0.60	60.95
MACOAH PASSAGE	09/04	10/04	700	100	4	0.80	9.10
MACOAH PASSAGE	17/03	18/03	2000	175	1	0.80	3.50
NETTLE ISLAND	13/03	15/03	2050	25	6	0.40	43.05
NETTLE ISLAND	13/03	15/03	2000	20	5	0.40	24.00
NETTLE ISLAND	13/03	15/03	900	20	7	0.20	27.36
NETTLE ISLAND	13/03	15/03	2550	20	7	0.30	67.83
PRIDEAX ISLAND	13/03	15/03	3000	20	6	0.40	50.40
AREA TOTAL			14525.				286.19
AREA: 24, CLAYOQUOT SOUND							
ELBOW BANK	08/03	08/03	914	91	5	0.10	74.86
ELBOW BANK	08/03	08/03	1280	732	3	0.40	224.87
ELBOW BANK	08/03	08/03	183	137	5	0.00	25.07
ELBOW BANK	08/03	08/03	1280	457	3	0.40	140.39
ELBOW BANK	08/03	08/03	37	27	4	0.20	0.52
HOT SPRINGS COVE	25/03	31/03	183	1	3	0.50	0.04
HOT SPRINGS COVE	25/03	31/03	110	1	3	0.00	0.04
HOT SPRINGS COVE	25/03	31/03	73	9	4	0.10	0.38
HOT SPRINGS COVE	25/03	31/03	91	9	3	0.10	0.29
HOT SPRINGS COVE	25/03	31/03	183	9	4	0.10	0.96
HOT SPRINGS COVE	25/03	31/03	32	7	0	0.00	0.00
MCINTOSH BAY	08/03	08/03	110	91	9	0.50	15.02
MCINTOSH BAY	08/03	08/03	46	14	5	0.50	0.32
MCINTOSH BAY	08/03	08/03	46	5	7	0.00	0.44
MCINTOSH BAY	08/03	08/03	91	91	9	0.00	24.84
MCINTOSH BAY	08/03	08/03	46	14	6	0.50	0.45
MCINTOSH BAY	08/03	08/03	91	91	9	0.20	19.87
RITCHIE BAY	12/03	12/03	37	7	3	0.00	0.10
RITCHIE BAY	24/03	24/03	640	9	9	0.20	13.82
RITCHIE BAY	24/03	24/03	64	2	3	0.00	0.05
RITCHIE BAY	12/03	12/03	64	14	4	0.00	0.58
RITCHIE BAY	24/03	24/03	55	2	3	0.00	0.04

Table 13 (cont'd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 24, CLAYOQUOT SOUND	CONTINUED						
RITCHIE BAY	24/03	24/03	183	18	9	0.10	8.89
RITCHIE BAY	12/03	12/03	23	5	3	0.00	0.05
RITCHIE BAY	24/03	24/03	64	9	9	0.20	1.38
RITCHIE BAY	24/03	24/03	457	11	8	0.20	9.65
ROBERT POINT	10/03	10/03	37	14	2	0.40	0.06
ROBERT POINT	12/03	12/03	73	14	4	0.15	0.56
ROBERT POINT	10/03	10/03	64	14	3	0.00	0.36
ROBERT POINT	12/03	12/03	23	9	3	0.00	0.08
SARANAC ISLAND	24/03	24/03	137	27	5	0.40	2.22
SARANAC ISLAND	24/03	24/03	55	9	5	0.10	0.45
SARANAC ISLAND	24/03	24/03	137	18	7	0.05	4.45
VARGAS ISLAND	09/03	09/03	183	91	7	0.25	23.73
VARGAS ISLAND	09/03	09/03	137	18	3	0.50	0.49
VARGAS ISLAND	09/03	09/03	46	18	5	0.10	0.75
VARGAS ISLAND	09/03	09/03	640	160	5	0.00	102.40
VARGAS ISLAND	09/03	09/03	274	206	4	0.00	36.69
VARGAS ISLAND	09/03	09/03	1006	229	5	0.15	195.82
VARGAS ISLAND	09/03	09/03	206	91	3	0.25	5.62
YELLOW BANK	24/03	24/03	914	320	4	0.10	171.10
AREA TOTAL			10315.				1107.74
AREA: 25, NOOTKA SOUND							
FRIENDLY COVE	25/03	29/03	300	30	2	0.75	0.45
FRIENDLY COVE	25/03	29/03	350	20	4	0.20	3.64
NUCHATLITZ INLET	05/03	06/03	500	170	2	0.10	15.30
NUCHATLITZ INLET	05/03	06/03	120	45	2	0.00	1.08
NUCHATLITZ INLET	05/03	06/03	470	260	2	0.30	17.11
NUCHATLITZ INLET	05/03	06/03	280	120	2	0.20	5.38
NUCHATLITZ INLET	05/03	06/03	170	125	2	0.10	3.82
NUCHATLITZ INLET	05/03	06/03	70	70	4	0.00	3.18
OUTER NUCHATLITZ	05/03	06/03	100	70	3	0.50	1.40
OUTER NUCHATLITZ	05/03	06/03	800	280	3	0.45	49.28
OUTER NUCHATLITZ	05/03	06/03	80	80	3	0.30	1.79
OUTER NUCHATLITZ	05/03	06/03	120	60	3	0.80	0.58
OUTER NUCHATLITZ	05/03	06/03	170	45	3	0.00	3.06
OUTER NUCHATLITZ	05/03	06/03	470	80	2	0.40	4.51
OUTER NUCHATLITZ	05/03	06/03	170	20	5	0.00	3.40
PORT LANGFORD	05/03	06/03	130	30	4	0.00	2.54

Table 13 (contd). HERRING SPAWNING SUMMARY TABLE FOR 1984.

SPAWNING GROUND	DATE SPAWNED START	END	LENGTH M.	WIDTH M.	CALCULATED INTENSITY	EST. BARE AREA	STD.SQ. M. (1000'S)
AREA: 25, NOOTKA SOUND	CONTINUED						
PORT LANGFORD	03/03	06/03	2200	30	4	0.00	42.90
PORT LANGFORD	05/03	06/03	70	30	4	0.00	1.37
AREA TOTAL			6570.				160.78
AREA: 27, QUATSINO SOUND							
GALATO CREEK	06/03	06/03	200	10	5	0.25	1.50
GREENWOOD POINT	08/03	11/03	1800	25	8	0.10	97.20
HALL BANK	08/03	11/03	250	25	9	0.25	14.06
HAZARD POINT	09/03	10/03	1300	20	8	0.10	56.16
LEESON HARBOUR	07/03	10/03	800	25	8	0.15	40.80
MOORES ISLAND	08/03	09/03	400	30	7	0.10	20.52
MOORES ISLAND	06/03	07/03	200	20	8	0.25	7.20
MOORES ISLAND	08/03	09/03	350	20	6	0.15	8.33
QUASHTIN CREEK	09/03	10/03	500	20	8	0.20	19.20
WEDEL ISLAND	07/03	10/03	800	20	7	0.10	27.36
WINTER HARBOUR	09/03	09/03	100	10	5	0.25	0.75
AREA TOTAL			6700.				293.08
AREA: 29,							
BOUNDARY BAY	28/02	01/03	914	68	1	0.00	3.11

ACKNOWLEDGEMENTS

The authors wish to thank Lloyd Webb and Bob Armstrong for critically reviewing the manuscript, Valerie Rogers for doing much of the typing and Alice Fedorenko for preparing the manuscript for publication.

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Appendix 1. Guidelines for the 1983 herring food and bait fishery, B.C., October 1983.

TO: FISHERMEN & FISH PROCESSORS

RE: GUIDELINES FOR THE 1983 BRITISH COLUMBIA
FOOD AND BAIT HERRING FISHERY

Consultation with the Herring Industry Advisory Board indicated a desire to reduce the level of the 1983 Food & Bait Herring Fishery to 1000 metric tonnes. This reflects industry's concern over weak markets for food and bait products, while recognizing that most herring catches should be allocated to a more lucrative fishery.

As a result, the industry requested that DFO implement a vessel quota system in 1983. The attached Guidelines, I think, describe the best possible way to rationalize this small fishery. It is thought that this method of implementing the fishery will place the emphasis more on independent fishermen as opposed to the company designating fishermen system used in 1982.

Yours very truly,

C.W. Shinners
Director-General
Fisheries-Pacific

October 1983

GUIDELINES FOR THE 1983 HERRING FOOD & BAIT FISHERY

The 1983 Food & Bait fishing season will commence on or after November 21st, and terminate on or about December 9th, 1983. Opening dates for specific areas will be as described in this Bulletin under "Proposed Fishing Patterns". Except for special personal use, three tonne licences and traditional bait pond licences, separate fisheries for commercial bait **WILL NOT** be conducted this year.

EXPORT REQUIREMENTS

The Pacific Herring Fishery Regulations prohibit the export of herring from the Province unless it is canned, salted, pickled or frozen and has been inspected by an Inspector designated under Section 17 of Fishing Inspection Act. This means that the export of fresh herring, including the temporary export of herring for freezing and storage, will not be permitted.

ENTRY AND LICENCING REQUIREMENTS

1. Food & Bait Fishing Licences in this 1983 fishery will be issued to only 20 vessels in 1983. Five vessels will be allotted 50 tonne vessel quotas North of Cape Caution. (Fish have to be caught and delivered in the northern area). Fifteen vessels will be allotted 50 tonne vessel quotas South of Cape Caution (Fish have to be caught and delivered in the southern area).

2. The means of selecting the 20 vessels will be by lottery. Each interested vessel owner/operator may submit his application to fish either in the North or in the South, but not both. Lottery applications will be available only at the Prince Rupert and the Vancouver Offices, commencing on November 4th, 1983, and terminating at 2:00 pm on November 10th, 1983. The draw will be conducted on November 10th, 1983, and the Industry will be notified of qualifying vessels via the telex media. These licences are non-transferable.

3. Each vessel may only be entered on one application.

4. Food & Bait Herring Fishing Licences will be issued to vessel owners under the following conditions at Prince Rupert and Vancouver after November 14th, 1983:

   (a) Each vessel or owner must have a valid "A" seine, "H" seine or "T" licence.

   (b) All fishing vessels catching, transporting or delivering herring during the 1983 Food & Bait Herring Fishery will be subject to inspection of the fish hold and refrigeration system, where applicable, prior to issuance of a licence.

   (c) All vessels engaged in the 1983 Food & Bait Herring Fishery must use a properly functioning R.S.W. or C.S.W. system.

ADMINISTRATION AND REGULATION OF THE FISHERY

Section 12 of the B.C. Fish Inspection Regulations states "where fresh herring are destined for human consumption, processing, other than by icing or chilling, shall commence within 24 hours of delivery (offloading) at the processing establishment, and shall not be discontinued until the fish has been preserved to a degree which ensures maximum quality of the end product".

1. A herring purse seine must not exceed 500 m (275 fathoms) in length and the mesh size shall not be less than 25 mm (1") extension measure.

2. Notice of openings will provide sufficient time for all vessels in the vicinity of proposed fisheries to participate. An officer aboard the designated management patrol vessel will open the area using 2318 (HF) and Channel 78A (VHF).

3. Closures will be made in the event that small, damaged or unsuitable fish are being spilled, or if substantial, incidental catches of salmon occur.

4. No vessel will be permitted to catch, have on board, or deliver more than 50 tonnes of herring.

5. Vessels must hail catch tonnage that is taken aboard to a designated patrol vessel prior to leaving the fishing grounds.

6. All deliveries must be offloaded within 18 hours of capture. The onus is on the vessel master to clear with plants for reserved offloading.

7. Loads will be subject to consistent monitoring for quality. Failure to comply with any of the conditions of the licence may result in cancellation of this licence and possible cancellation of other future fishing privileges.

8. Seizure of catch, fishing vessel, and fishing gear, will occur if it is found that any of the conditions of the Special Food & Bait Fishing Licence issued under the Pacific Herring Fishery Regulations (Section 18(2).), if any of the following conditions of the licence are violated:

   (a) the commencement and termination dates;

   (b) the location of the fishery;

   (c) the identity of the fishing vessel;

   (d) the type of gear to be used;

   (e) the quantity of fish that may be caught, held on board, and delivered, and

   (f) the means of handling and storing the catch.

9. The mesh size of a trawl net should not be less than 25 mm.

PROPOSED FISHING PATTERNS

1. **NORTH COAST:**

Total catch anticipated 250 tonnes.

A. Queen Charlotte Islands Sub-Districts (Areas 1, 2E & 2W):

A portion of Area 1 will open for licence holders by Public Notice on or after Monday, November 21st, 1983.

B. Northern Sub-Districts (Areas 3, 4 & 5):

Open by Public Notice for licence holders on or after November 21st, 1983, except that:

All waters of the Northern Sub-District north of a straight line drawn true east and west through Oval Point and lying east of 120 degrees, 30 minutes west longitude are closed to the Food & Bait Herring Fishery.

C. Central Coast Sub-Districts (Areas 6, 7, 8, 9 & 10):

No anticipated openings.

2. **SOUTH COAST:**

Total maximum catch anticipated 750 tonnes.

A. Upper East Coast Sub-Districts (Areas 11, 12 & Northern portion of Area 13).

No anticipated openings.

B. Middle East Coast Sub-Districts (Areas 13-16):

The lower portion of Area 13 in the vicinity of Deepwater Bay will open by Public Notice for licence holders on or after November 21st, 1983, subject to availability of herring and absence of chum salmon stocks.

C. Lower East Coast Sub-Districts (Area 17 & 18):

Portions of the lower east coast will open on or after November 21st, 1983, for licence holders by Public Notice subject to herring stock assessment and incidental catches of salmon.

D. West Coast of Vancouver Island Sub-Districts (Areas 22-27):

No anticipated openings.

APPLICATION

October, 1983

1983 HERRING FOOD & BAIT FISHERY
BOAT QUOTA LOTTERY SYSTEM

I, _____, the owner/operator of the herring fishing vessel _____ _____, Type of Licence (ie: "A", "H" or "T" _____ and CFV # _____, submit application to enter the 1983 Herring Food & Bait 50 tonne boat quota lottery system.

Entry Details

1. Food & Bait fishing licence will be issued to 20 vessels in the 1983 fishery.

   (a) Five vessels will be allotted 50 tonne quotas in the North. Vessels are required to catch and deliver in the North.

   (b) Fifteen vessels will be allotted 50 tonne quotas in the South. Vessels are required to catch and deliver in the South.

2. All entries must be received at the Prince Rupert or Vancouver Office, 1090 W. Pender Street, no later than 2:00 pm on November 10th, 1983, to be eligible.

3. Licences for this fishery are non-transferable between vessels.

4. Each applicant must meet the following entry criteria:

   (a) Each applicant must have a valid "A" seine, "T" or "H" seine licence.

   (b) All vessels must have R.S.W. or C.S.W. systems.

   (c) Each vessel may only be entered on one application.

CHECK ONE BOX ONLY

A. North of Cape Caution ☐ (5 boats to be chosen)

B. Strait of Georgia ☐ (15 boats to be chosen)

INVALID IF BOTH BOXES ARE CHECKED

SIGNED _____

DATE _____

Appendix 2. Guidelines for the 1984 roe herring fishery, B.C., November 1983.

TO: HERRING ROE LICENCE HOLDERS

Dear Sir or Madam,

Please find enclosed the 1984 roe herring licencing and fishery management plan. This includes:

(1) **Area Choice Form - 1984 Fishery:**

This form is to be completed and returned by December 15th, 1983, directly to the Licencing Office in Vancouver or Prince Rupert. Failure to return the Area Choice form by the required date can result in the licence holder being assigned to any one of the areas by the Department.

(2) **1984 Licence Application Form.**

This may accompany the Area Choice form or be submitted separately by the licence holder. All applications must be returned to the Licencing Offices in Vancouver or Prince Rupert before January 15th, 1984.

Fishermen may elect to assign two licences to a vessel provided that the licences are to be fished in separate areas.

(3) **Guidelines for the 1984 Roe Herring Fishery.**

This document details the quotas by gear type for each of the three licence areas, proposed fishing patterns, administrative and regulatory concerns, and licencing requirements for the 1984 fishery.

(4) **Information Bulletin - Review of the 1982-83 Herring Fishery.**

This is an information bulletin which reviews the 1982-83 herring fishery and spawn records, as well as some historic fishing and spawn data. This information may assist you in the preparation of your Area Choice form.

To facilitate more informed area choices by fishermen and provide for an acceptable distribution amongst the Areas, the Department will post the distribution of vessels as fishermen make their choices. This will be shown at the Vancouver Office and at all District Offices. Information will be telexed to Industry at regular intervals.

Following December 15th, fishermen will have an opportunity to change their Area Choice any time prior to issuance of the 1984 licence certificate. Procedures for area changes are detailed in the Guidelines.

Further information regarding licencing may be directed to the Licencing Offices. Additional information about the 1984 management plan is available from the Regional Herring Co-ordinator in Vancouver.

Yours very truly,

D.D. Wilson
Director
Field Services Branch

GUIDELINES FOR THE 1984 ROE HERRING FISHERY *

SEPTEMBER 1983

The Area Licencing System in the roe herring fishery will be carried over for the 1984 season. As in previous years, three separate licencing areas have been defined:

A. North of Cape Caution
B. Strait of Georgia/Johnstone Straits
C. West Coast of Vancouver Island

Several important refinements in the Area Licencing Program will be detailed below. The total catch quota for the 1984 roe herring fishery is 31,300 metric tonnes. The anticipated allocation of this catch to area and gear type will also be detailed in the following section.

MANAGEMENT PLAN FOR THE 1984 ROE HERRING FISHERY

The fishery in 1984 will be based on a predetermined catch or quota. The basis for this system is a fixed exploitation level of returning stocks.

If recruitment is more or less than predicted, the predetermined catch or quota will not be adjusted in the current year. Accordingly, catch adjustments will be made the following year after escapement measurements and other stock status information is analyzed.

Quota levels for the 1984 season by licence area and gear type are as follows:

LICENCE AREA	CATCH QUOTAS (Metric Tonnes)		
	SEINE	GILLNET	TOTAL
A. North of Cape Caution	9700 (64%)	5500 (36%)	15,200
B. Strait of Georgian/Johnstone Straits	4000 (34%)	7600 (66%)	11,600
C. West Coast of Vancouver Island	3500 (78%)	1000 (22%)	4,500
Total Coast	17200 (55%)	14100 (45%)	31,300

PROPOSED FISHING PATTERN

1. Stocks will be monitored in all major fishing areas and openings will be declared when warranted up to the limit of each licence area's gear quota.

2. South of Cape Caution no openings are anticipated in the Johnstone Strait area. It is anticipated that fishing areas in the Strait of Georgia and

* This is a general outline of the 1984 Herring Management Plan only & does not supercede the appropriate Fishery Regulations.

West Coast of Vancouver Island will open around late February or early March as stock conditions warrant.

3. North of Cape Caution fisheries are anticipated in the three major areas as shown below:

DISTRICT	METRIC TONNES		
	SEINE	GILLNET	ALL
QUEEN CHARLOTTE ISLANDS	4,100	500	4,600
PRINCE RUPERT	2,000	2,000	4,000
CENTRAL	3,600	3,000	6,600

ADMINISTRATION OF THE 1984 ROE HERRING FISHERY

1. The 55%/45% seine:gillnet catch division will apply in the 1984 fishery on an overall coastwide basis.

2. The Department will retain the one per punt restriction for gillnets for the 1984 season.

3. More than one licence may be assigned to either gillnetters or seiners vessel if they are for different areas.

4. Fishery Officers will ensure that sensitive herring spawning areas are protected from gear damage by establishing shallow water net boundaries inside which no fishing shall take place.

5. Vessels transferring catches from hold to hold must stand off the spawning grounds in areas designated as gurry grounds by the Fishery Officer, according to Section 43 of the Fisheries Act.

6. The Department will continue its policy of attempting to achieve the best percentage of roe recovery compatible with sound conservation principles. Generally the roe yield standard is 10%; however, the roe yield for the opening for seines in the Strait of Georgia may be based on 9%.

7. The precise opening time for seines will not be announced in advance. A time period in which the opening will occur will be announced; however, the precise opening time will occur within the time period previously set out. No further sets may be made beyond the stated closed time announced by the Fishery Officer. Openings will be broadcast over the radio telephone on 2318 (HF) and Channel 78A (VHF) with no further advance warning.

8. Gillnet fishery openings will be announced as far in advance as possible.

9. Notice of closures will be as short as required for conservation purposes. For gillnet closures, enough notice will be given to provide reasonable opportunity for fishermen to remove their fishing gear from the water.

10. An attempt will be made to broadcast to the fleet anticipated times to fulfillment of expected catch quotas for an area to prevent vessels from travelling unnecessarily to areas that would probably close before they arrived.

11. Fishermen not licenced for the given area and the licence packer vessel fleet must stand off fishing areas as designated by a Fishery Officer. No compliance may result in a loss of fishing opportunities or prosecution.

12. The seine fleet is requested to avoid excessive disturbance of herring caused by vessels running back and forth over schools prior to openings. In some cases specific requests to stay off particular areas will be broadcast from patrol vessels and fishermen will be expected to comply.

13. Gillnet fishermen may use the net drum on their salmon fishing vessel to pull their roe herring gillnets across their punts, provided

    - the punt is properly licenced for roe herring for the appropriate area;
    - all persons aboard the vessel engaged in the operation hold valid personal commercial fishing licences.

ROE HERRING GILLNET FISHERY REGULATIONS

1. No person shall use more than one section of herring gillnet. No person shall use a gillnet that is greater than 135 m.

2. No person shall use a gillnet containing more than 100 meshes in depth, the mesh size of which is less than 57 mm (2.25 inches) and not greater than 64 mm (2.5 inches).

3. Shaker panels shall not exceed a depth of 2 m with a mesh size not less than 150 mm (6 inches).

4. Gillnet must be marked on both ends with buoys not less than 125 cm in circumference, and be of similar colour.

5. Gillnet fishermen must attach a gillnet licence tag to his gillnet. A gillnet licence tag shall:

    (a) be issued to the applicant with his herring roe licence;

    (b) be valid only for the licence with which it was issued, and

    (c) shall be attached to one end of the gillnet being used, be clearly visible and at least 30 cm above the surface of the water.

6. When fishing with gillnets, no person shall leave any anchors, buoys or lines in the water during any closed time.

7. In fishing for roe herring from a punt, or while having roe herring aboard a punt, no person shall use or carry a greater length or depth of net in a

hung condition than is permitted by the Pacific Herring Fishery Regulation. It should be noted that extra net may be carried on accommodation vessels or mothership.

ROE HERRING SEINE FISHERY REGULATION SUMMARY

A herring purse seine shall not be greater than 500 m (275 fathoms) in length, and mesh not less than 25 mm (1 inch) extension measure.

LICENCING REQUIREMENTS FOR THE ROE HERRING FISHERY

1. Included in this licence renewal package is an Area Choice Form. This form, indicating your preferred fishing area, must be returned to the Department prior to December 15th, 1983. Every licence holder must choose one, and only one, Area by December 15th, 1983, and will be awarded the area of first choice.

   If the number of licence holders selecting any Area is too large relative to the present quota for that Area, the Department will allow fishermen to change their Area Choice prior to issuance of the licence certificate. In this respect licence holders may change their Area Choice by:

   (a) submitting a letter to the Licencing Section in Vancouver or Prince Rupert before the licence certificate is issued.

   (b) indicating their change in Area selection on their renewal application.

IN ANY CASE NO CHANGES TO AREA SELECTION WILL BE ACCEPTED AFTER JANUARY 15TH, 1984, OR EARLIER IF THE 1984 LICENCE HAS BEEN ISSUED.

2. Vessels operating in the roe herring fishery must have a roe herring licence issued in respect of that vessel. For the 1984 roe herring season, a licence holder may allow his licence to be operated by another person. Where an Indian has been issued a licence to operate a vessel in fishing for roe herring, no person except an Indian may operate that vessel.

APPLICATION AND FEES FOR 1984 ROE HERRING LICENCES MUST BE RECEIVED OR POSTMARKED NO LATER THAN JANUARY 15TH, 1984. LICENCE WILL BE ISSUED FROM BOTH THE VANCOUVER AND PRINCE RUPERT LICENCE OFFICES.

3. Each holder of a roe herring licence or his assignee must designate, upon application for his licence, the vessel he intends to use in the 1984 roe herring fishery. If a vessel formerly used is no longer licenced for use in any fishery, the licence holder must return the C.F.V. plates issued to that vessel. C.F.V. plates, where applicable, should be returned along with the herring roe fishing licence application. Two roe herring area licences of the same gear type may be assigned to one vessel if they are for different areas.

Once the licence renewal application is submitted for processing, alternate vessel designations can only be considered before January 15th, 1984, and if they are made on the form "Personal Commercial Licence Vessel Redesignation Application", signed by the licence holder and accompanied by the required documentation.

NO CHANGES IN VESSEL DESIGNATION WILL BE APPROVED BETWEEN JANUARY 16TH, 1984 AND APRIL 30TH, 1984.

4. On gillnet skiffs the vessels Area Licence Decal must be displayed on the C.F.V. plate which is to be affixed to the transom. This year a net decal is being introduced for the first time and must be affixed to either of the two buoys attached to the end of the net.

5. On seine vessels the Area Licence Decal must be mounted on the starboard side of the hull or wheelhouse. At the request of Industry an area pennant will be issued with each seine licence. This pennant should be displayed prior to and during fishing operations.

6. The 1984 declarations for lost decals will be taken by Fisheries Officers on the fishing grounds prior to an area opening, and for a fee of $10.00 a replacement decal may be issued by an Officer after being satisfied as to the loss. The replacement will be (designated by an "R") for that area and is to be affixed as described in #4 or #5 above.

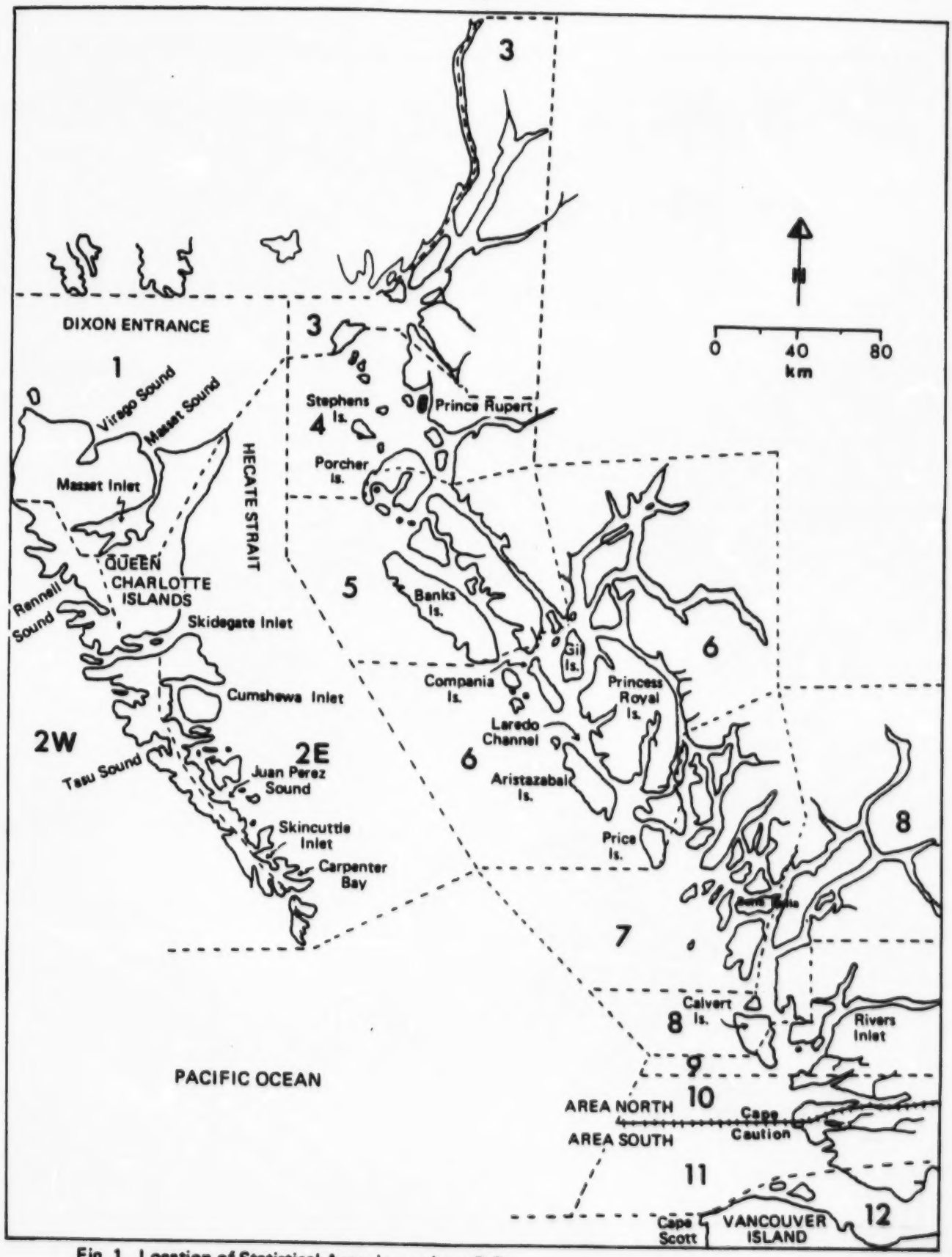

Fig. 1. Location of Statistical Areas in northern B.C.

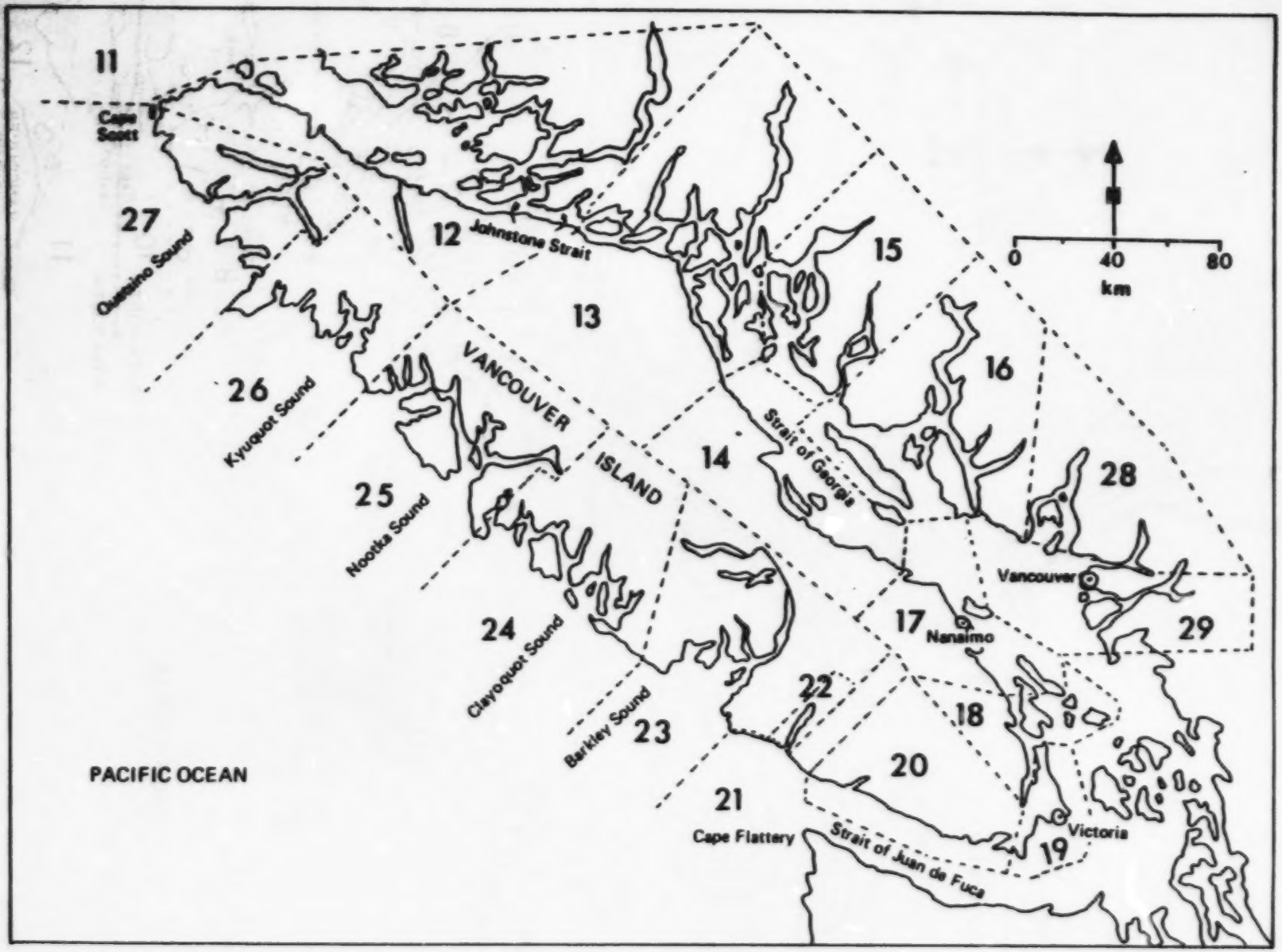

Fig. 2. Location of Statistical Areas in southern B.C.

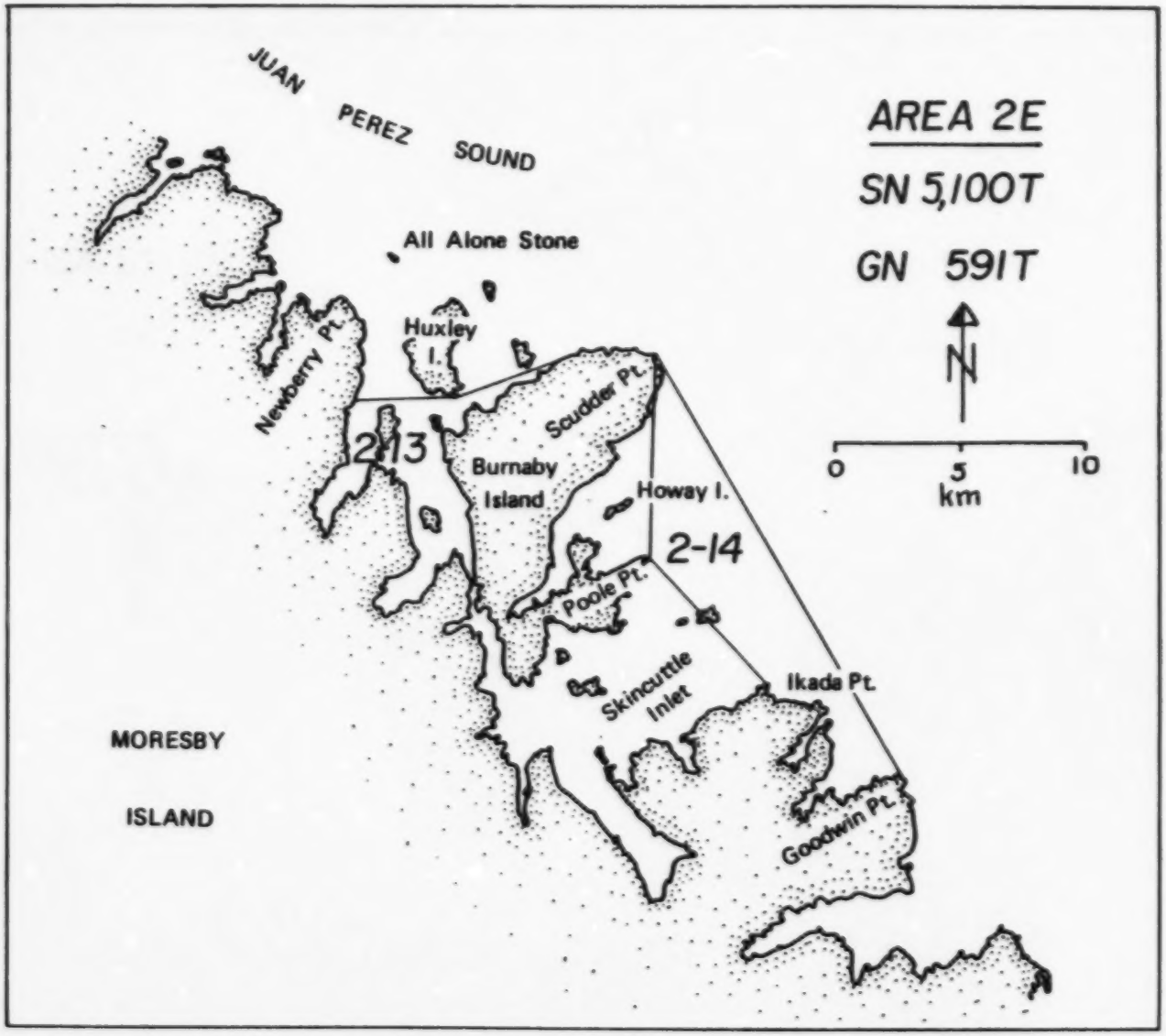

Fig. 3a. Roe herring fishing boundaries and hailed catches by gear type in Area 2E, Skincuttle Inlet, 1984.

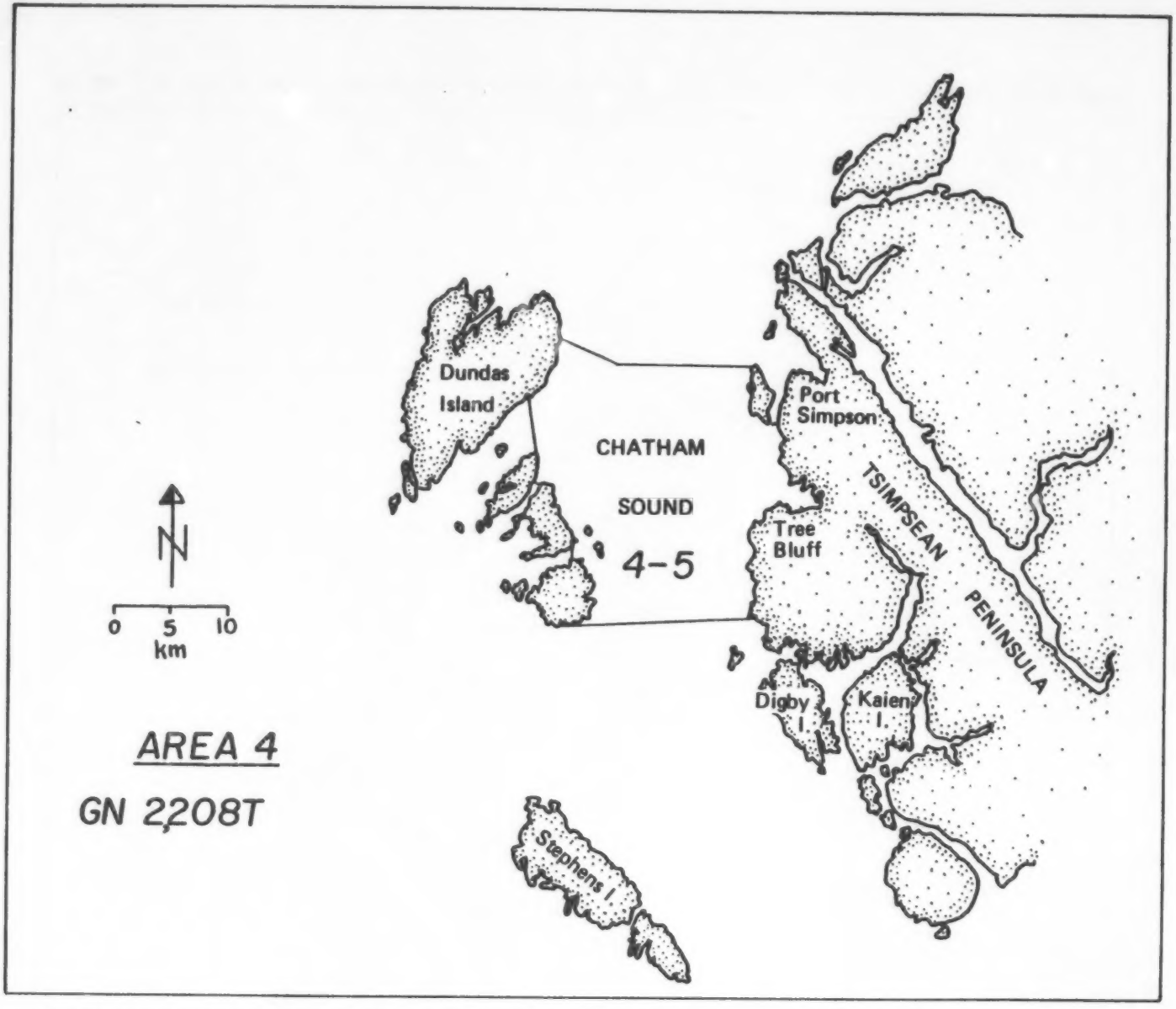

Fig. 3b. Roe herring fishing boundaries and hailed catches by gear type in Area 4, Chatham Sound, 1984.

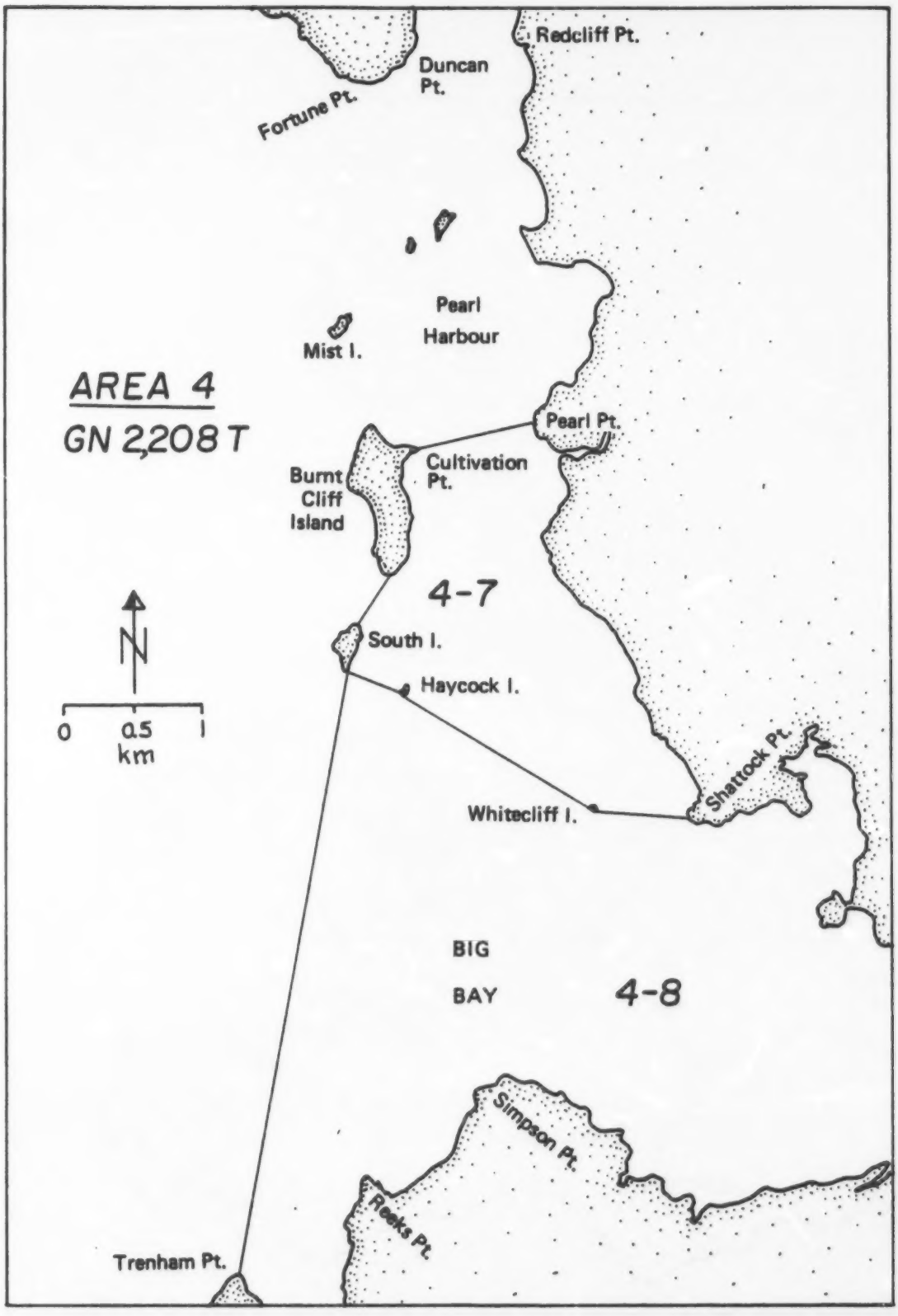

Fig. 3c. Roe herring fishing boundaries and hailed catches by gear type in Area 4, Big Bay, 1984.

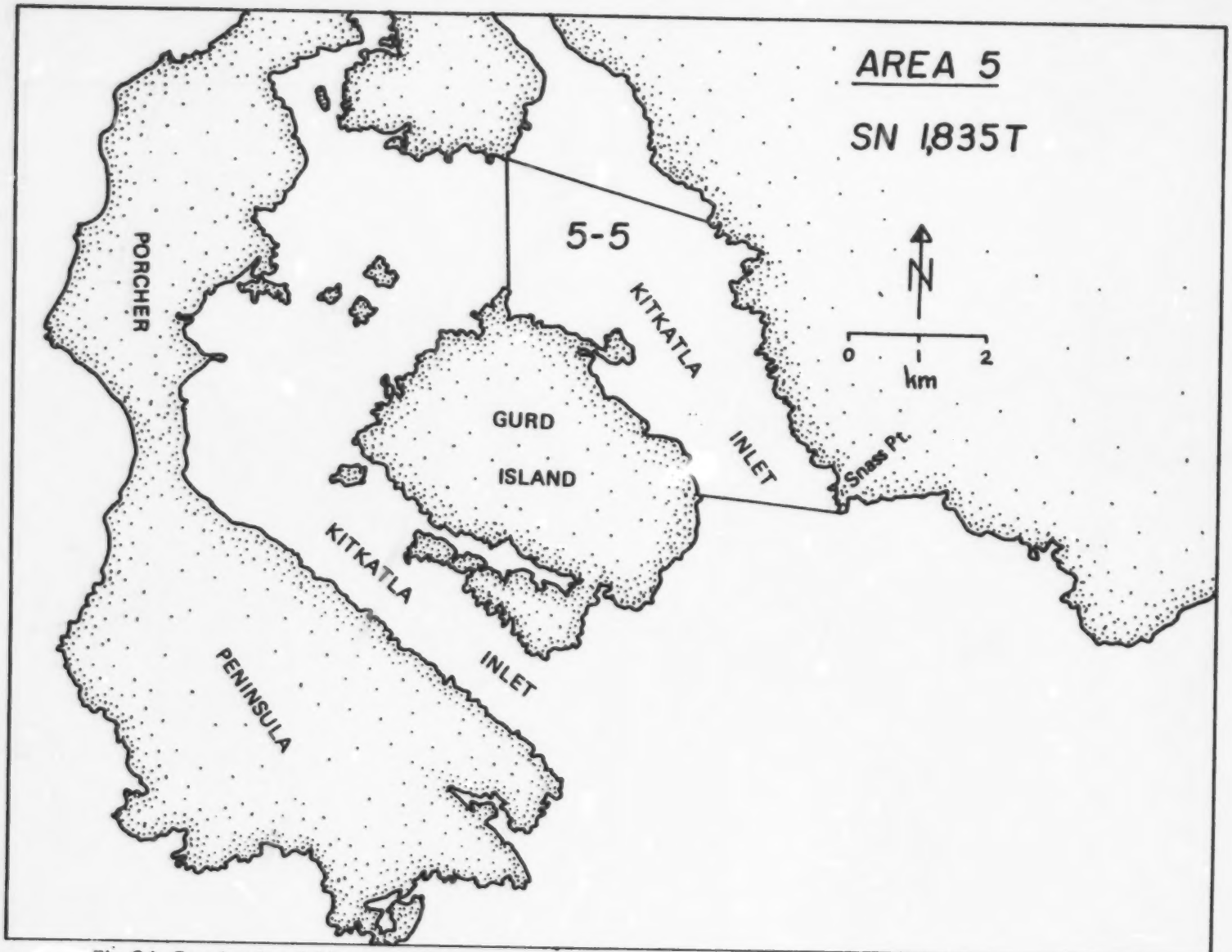

Fig. 3d. Roe herring fishing boundaries and hailed catches by gear type in Area 5, Kitkatla Inlet, 1984.

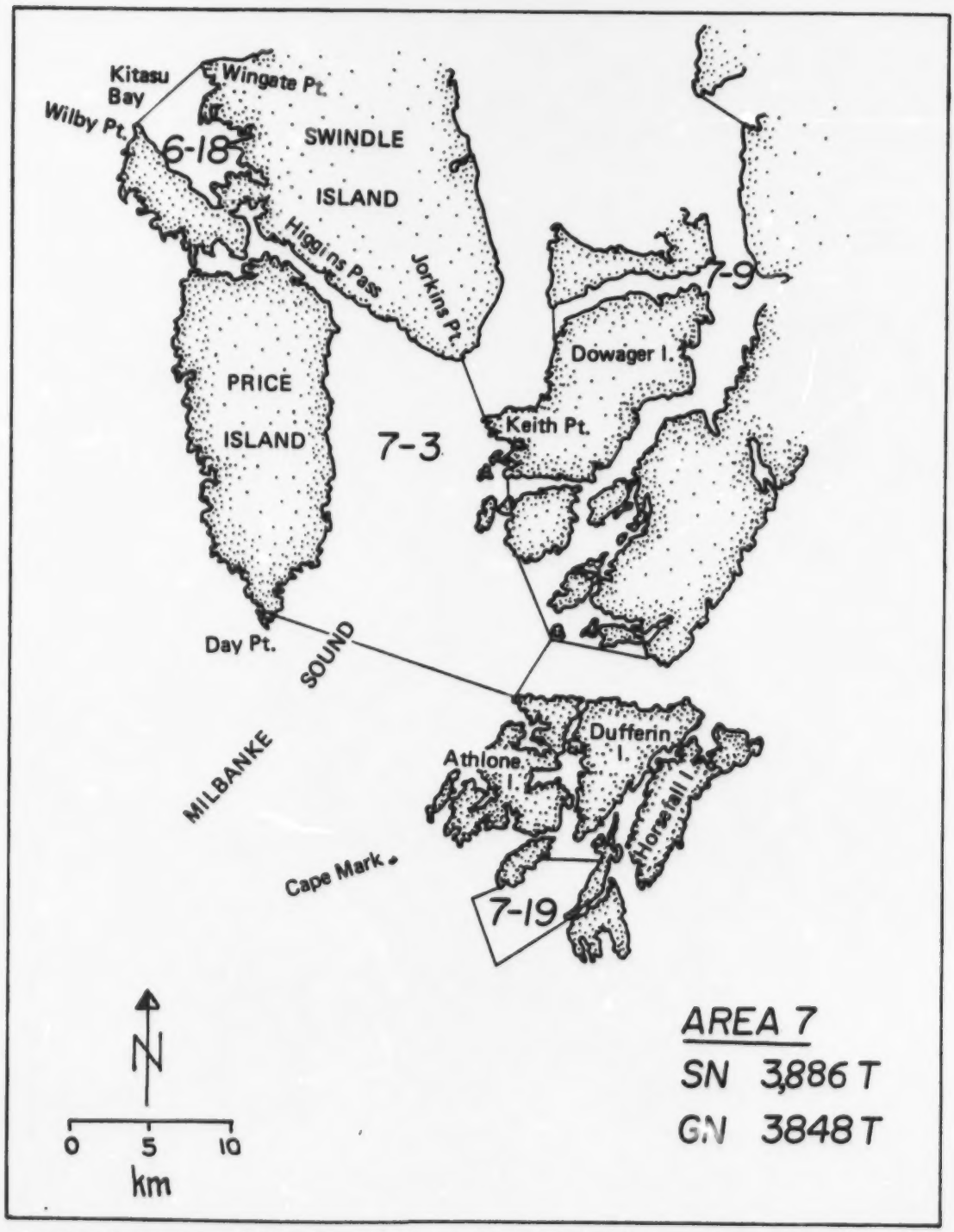

Fig. 3e. Roe herring fishing boundaries and hailed catches by gear type in Areas 6 and 7, Kitasu - Milbanke, 1984.

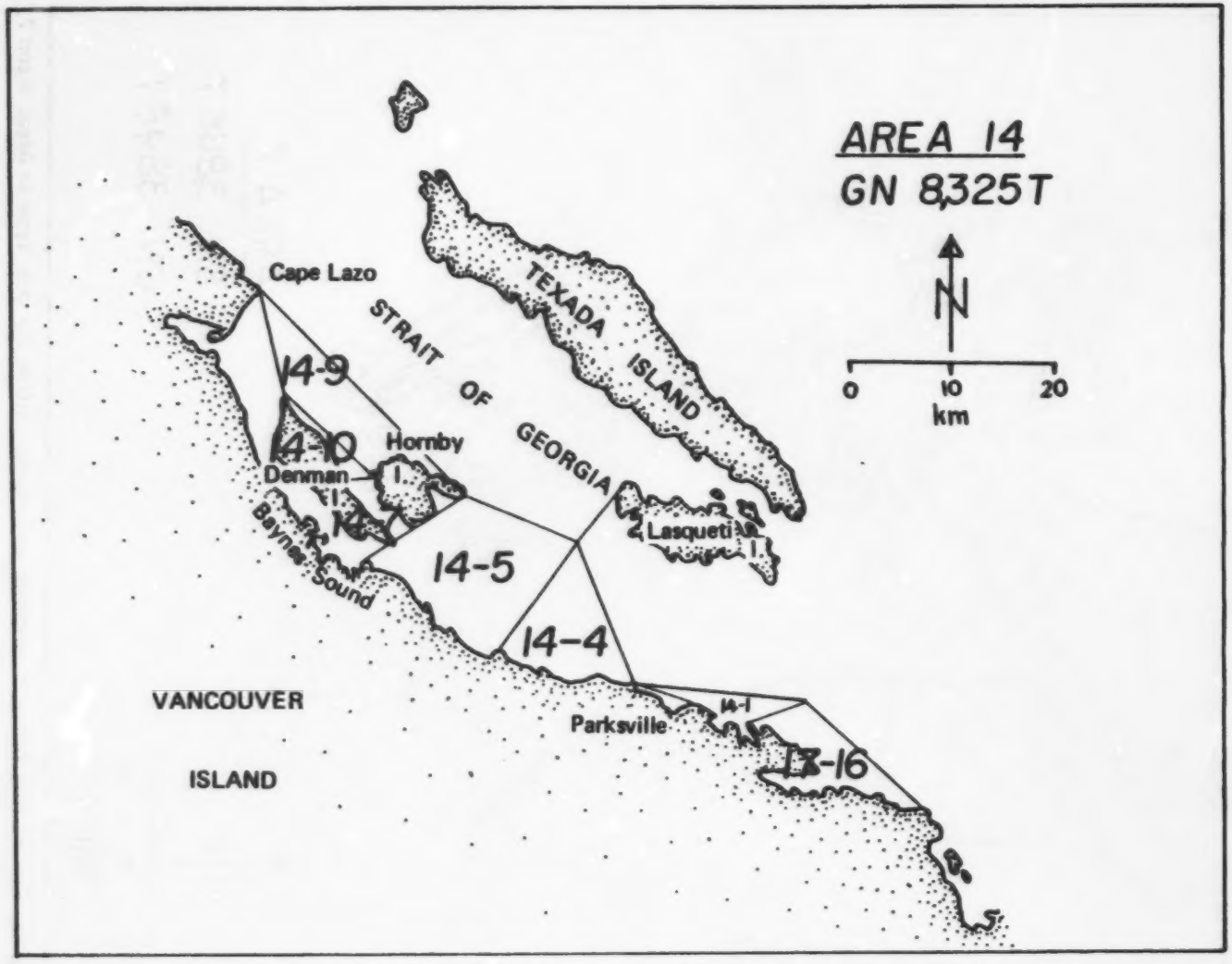

Fig. 3f. Roe herring fishing boundaries and hailed catches by gear type in Area 14, Hornby/Denman, 1984.

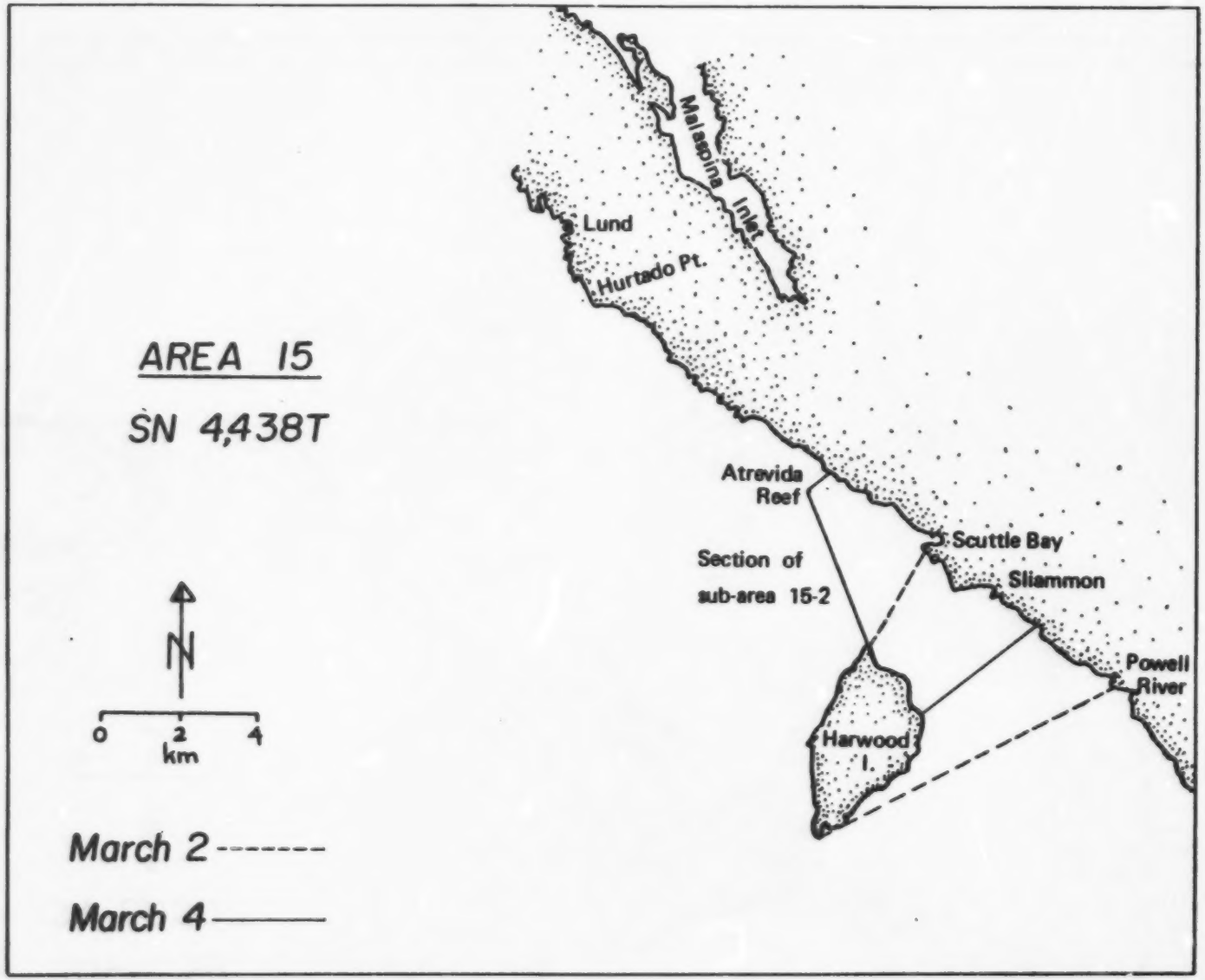

Fig. 3g. Roe herring fishing boundaries and hailed catches by gear type in Area 15, Powell River, 1984.

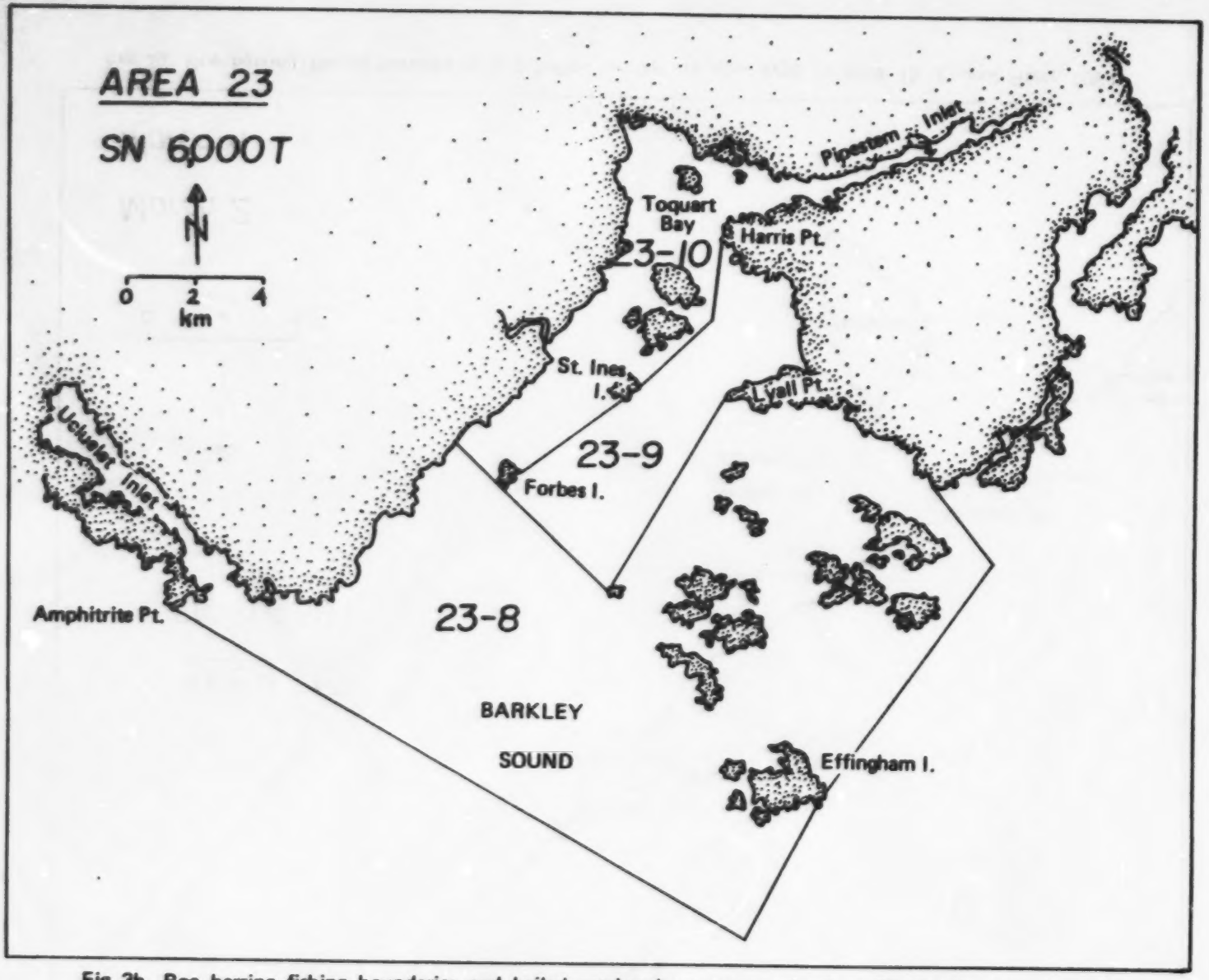

Fig. 3h. Roe herring fishing boundaries and hailed catches by gear type in Area 23, Barkley Sound, 1984.

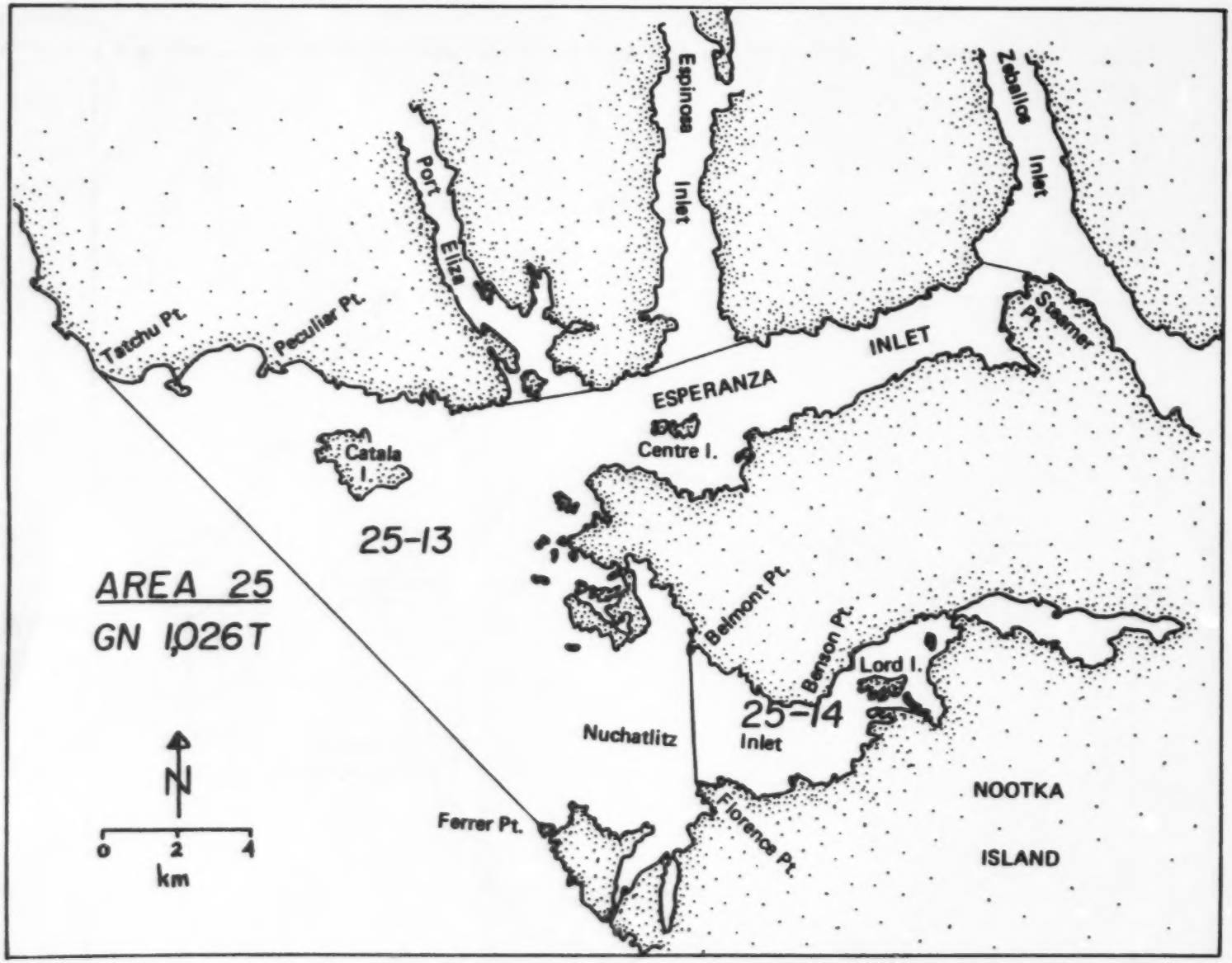

Fig. 3i. Roe herring fishing boundaries and hailed catches by gear type in Area 25, Esperanza/Nuchatlitz, 1984.

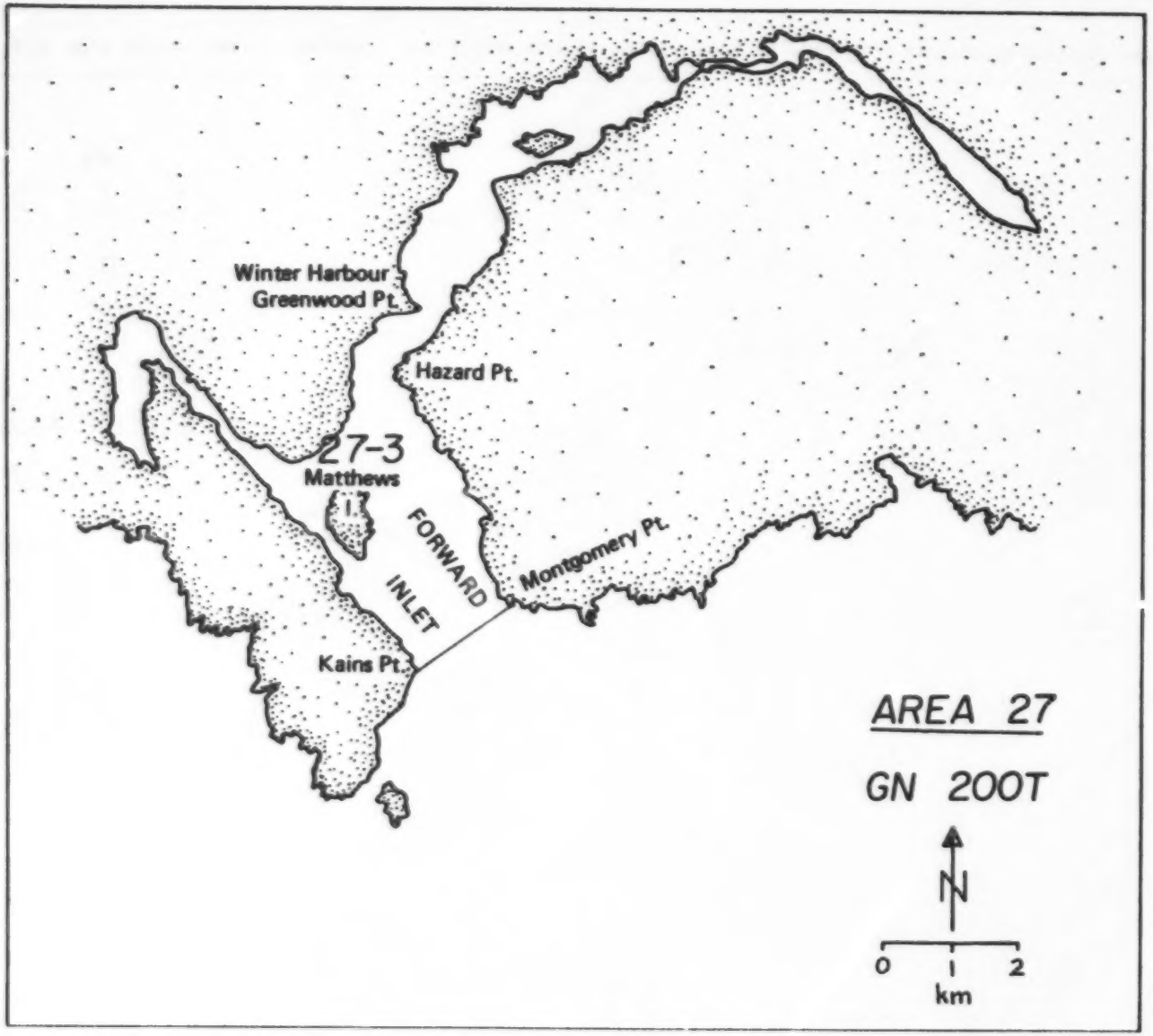

Fig. 3j. Roe herring fishing boundaries and hailed catches by gear type in Area 27, Winter Harbour, 1984.